Report

Site Investigations and Response Actions - General Electric Court Street Facility Building B

General Electric Company
Syracuse, New York

April 1991

O'BRIEN & GERE

2700.029

REPORT

SITE INVESTIGATIONS AND RESPONSE ACTIONS

GENERAL ELECTRIC COURT STREET FACILITY

BUILDING B

GENERAL ELECTRIC COMPANY

SYRACUSE, NEW YORK

APRIL 1991

O'BRIEN & GERE ENGINEERS, INC.
5000 BRITTONFIELD PARKWAY
SYRACUSE, NEW YORK

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

EXHIBITS

SECTION 1 - BACKGROUND INFORMATION

In July, 1990, an environmental management review was conducted by General Electric Aerospace Environmental, Health and Safety management of certain GE facilities. As a result of this review, a plan was developed to investigate the area surrounding Building B at GE's Court Street plant. (CSP-B).

A manufacturing operation which used a powdered lead, zirconate, titanate compound (PZT) was located in CSP-B from 1958 until September 1982. Powdered PZT was mixed and blended into a slurry form which in turn was formed and fired into ceramic parts used in the manufacture of sonar devices. Because of the potential of fugitive emissions of powdered PZT from this operation, General Electric initiated efforts to identify any PZT in the surrounding environment.

The initial course of action was to investigate the area immediately surrounding CSP-B in an attempt to grossly define any site contamination within the existing fenced area by determining concentrations of total lead. Later, this investigation was expanded to areas outside the fenced area.

This investigation also evaluated the potential leachability of the lead within the environment. Leachability is related to transport and uptake by potential receptors, and is the basis for determining whether lead-containing materials must be handled as hazardous waste. Leachability was evaluated by analyzing samples using EPA's recently adopted Toxic Characteristic Leaching Potential (TCLP) test.

The purpose of this report is to summarize the site investigations and the response actions conducted at the General Electric Court Street facility to date. Section 2 describes the site investigations in each area addressed. Section 3 describes certain response actions which have been taken. Section 4 discusses the potential for human health risks. Sampling plans and sample results are presented as figures at the end of the report. Laboratory reports and other supporting data are furnished as appendices and exhibits.

SECTION 2 - SITE INVESTIGATIONS

2.01 Background Soil Samples

Various medium were sampled in an attempt to establish background levels of total lead to be used as a basis of comparison. The media sampled included air and soil.

Six ambient air samples were collected on the General Electric property near the fence line. These sampling points included locations that were both up- and downwind of CSP-B. The intent of these samples was to determine if airborne lead was present under ambient conditions.

Three background soil samples were taken at remote locations on the General Electric property well away from CSP-B or any other location that may be affected by PZT. The intent of these samples was to establish a site specific background range of total lead in native soils.

Table 1 summarizes the results of the background sampling effort. The background air samples reveal non-detectable levels of lead. The background soil samples revealed total lead concentrations that are well within documented background levels (see Exhibit B - Lead Dust in Residential Areas).

2.02 Grid Based Soil Samples

Grid based soil samples were collected within the fenced areas near CSP-B. Fifty-nine samples were analyzed for total lead, and randomly selected samples were analyzed for leachable lead (TCLP).

Results of these efforts are summarized on Table 2. Sample locations are shown on Figure G-1. Sample results revealed isolated areas containing levels of total lead greater than background. Samples analyzed for leachable lead revealed concentrations below the laboratory detection limit of 0.5 mg/l, indicating that the lead was not leachable within the soil matrix.

2.03 Catchbasin Sediment Samples

Sediment samples were collected from three catchbasins located near CSP-B and analyzed for both total and leachable lead.

Results of these efforts are summarized on Table 3. Sample locations are shown on Figure G-1. The results revealed levels of total lead greater than background levels in all three catchbasins and detectable levels of leachable lead present in the sediments from two of the three.

2.04 Dust Sample

A dust sample was collected from a roof vent which exhausted CSP-B. Due to the limited amount of sample material obtained, analysis was possible only for total lead.

The sample result is presented as Table 4. The roof vent location is shown on Figure G-1. The result revealed a level of total lead greater than background levels.

2.05 Soil Borings

Based on the sampling results discussed in Section 2.02, six soil borings were installed in the subject area. The borings were advanced to a total depth of 10 feet with discrete split spoon samples collected at the following depths:

A:	0" - 6"	G:	48" - 60"
B:	6" - 12"	H:	60" - 72"
C:	12"- 18"	I:	72" - 84"
D:	18"- 24"	J:	84" - 96"
E:	24" - 36"	K:	96" - 108"
F:	36" - 48"	L:	108"- 120"

Only samples A-D were analyzed for total lead while the remaining samples were retained for future analysis should the results from samples A-D indicate the need to do so.

Sample results are summarized on Table 5. Boring locations are shown on Figure G-1. Boring logs are provided as Appendix C.

2.06 Partially Buried Drum and Waste Pile Samples

A partially buried drum was discovered on the General Electric property near Sanders Creek. Upon visual inspection, it was discovered that this drum contained some type of waste material of unknown origin. A grab sample was collected from the material in the drum and from the surrounding soil. A soil sample was also collected from a waste pile that existed near the drum. These samples were analyzed for total lead. Also, the sample from the drum was analyzed for EP Toxic lead for waste characterization purposes.

Sample results are summarized on Table 6. Sample locations are shown on

Figure G-1.

The results indicated a level of total lead for the drum material that was within the previously established background levels. The result for the surrounding soil near the drum and waste pile revealed a level of total lead greater than background levels.

2.07 Outfall/Stream Samples

A soil sample was collected from the embankment to which the storm sewer serving CSP-B discharges. Also, stream sediment samples were obtained from Sanders Creek to which this outfall ultimately discharges. Samples were taken from the mid-stream points at locations approximately 10 feet upstream of the outfall, at the outfall, and approximately 10 feet downstream of the outfall.

Also, a visual inspection was made at the drainage pipe at the outfall. No sediments were observed within or around the pipe.

Sample results are summarized on Table 7. Sample locations are shown on Figure G-1.

Sample results indicate levels of total lead in the soil sample from the outfall embankment in excess of measured background levels. Sample results of the stream sediment samples indicate levels of total lead that were consistent with measured background levels.

2.08 Additional Soil Samples

Twenty additional soil samples were collected from outside the fenced area surrounding CSP-B. These soil samples were analyzed for total lead.

Sample results are summarized on Table 8. Sample locations are shown on Figure G-1. The results from these samples revealed mostly background or near background levels of total lead. There were, however, isolated areas that did contain levels of total lead in excess of the measured background levels.

2.09 Geophysical Investigation

Geophysical investigations were conducted to examine subsurface conditions at CSP-B. These consisted of conductivity and magnetometer surveys limited to the subject area.

Results indicated some anomalous areas which may indicate the presence of buried objects. The results did not, however, connect the potential presence of buried objects with the presence of PZT.

A more detailed discussion of these geophysical investigations and the findings is contained in Appendix D.

2.10 Boundary Survey

A licensed land surveyor was retained to establish the property boundaries in the CSP-B area. A copy of the boundary survey is included as Appendix E.

SECTION 3 - RESPONSE ACTIONS

An initial response action was undertaken to remove sediments from the catchbasins. The catchbasins were then taken out of service by the installation of permanent plugs in the outlets from each. The sediments removed from the catchbasins were placed in sealed drums and were disposed of by General Electric as part of their normal hazardous waste disposal program.

The partially buried drum discovered near Sanders Creek was removed along with the nearby waste pile. These materials were also drummed and disposed of as hazardous waste by General Electric. Also, the roof vents from CSP-B were covered with polyethylene sheeting.

In a separate, yet related response action, soil removed from the adjacent Living Word property was stockpiled in the fenced area near CSP-B and covered with poly sheeting (See O'Brien & Gere report dated October 1990).

SECTION 4 - INITIAL HEALTH RISK ASSESSMENT

PZT has been found to be a very stable compound in which the solubility of the lead component has been proven to be very low. This translates to little or no elevation of blood lead levels in workers who come into direct contact with PZT on a daily basis. An independent study conducted by researchers in Canada supports this conclusion. (see Exhibit A - "Worker Exposure to Lead Titanate Zirconate in an Ontario Company").

Because of the potential for lead exposure, General Electric employed blood lead testing for workers exposed to PZT for many years. Statistically, this testing has shown blood lead levels to be well within the norm for general population among workers. On the basis of these studies, it can reasonably be concluded that the lead found within the soils on the General Electric property is not likely to cause elevated blood levels in receptors who may be exposed to soils containing fugitive PZT. Persons exposed to PZT in the work environment are likely to have a much higher direct exposure to the product than persons who may be exposed to fugitive PZT in the soils; as these studies have shown, however, direct exposures in the work environment have not caused elevated blood lead levels.

EPA has established an interim soil clean-up level for total lead at 500 to 1000 ppm. (See Exhibit C - US EPA Memorandum, "Interim Guidance on Establishing Soil Lead Clean-up Levels at Superfund Sites"). The EPA memorandum notes, however, that the bioavailability of the lead in various chemical forms and particle sizes may be and important factor in assessing health risks associated with lead exposure from soils. The available PZT studies suggest that the bioavailability of lead in this form is limited, and that soil total lead concentrations higher than the 500 to 1000 ppm level may present little hazard.

Tables

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General Electric - Court Street Facility
Lead Sampling Program

Table 1. Background Sample Results

Sample No.	Location	Total Lead	Matrix	Date Collected
GE-CS-01	Upwind Parking Lot C	<0.5 ug/m^3	Air	8-29-90
GE-CS-03	Downwind Fenceline B	<0.5 ug/m^3	Air	8-29-90
GE-CS-04	Downwind Property	<0.5 ug/m^3	Air	8-29-90
GE-CS-05	Downwind Property B	<0.5 ug/m^3	Air	8-29-90
GE-CS-06	Downwind Property B	<0.5 ug/m^3	Air	8-29-90
GE-CS-07	Upwind Front B	<0.5 ug/m^3	Air	8-29-90
Background 1	NW Corner of Property	62 mg/kg	Soil	7-20-90
Background 2	GE-Near Deere Road	99 mg/kg	Soil	7-20-90
Background 3	GE-South Property Line	33 mg/kg	Soil	7-20-90

Notes:
(1) The units mg/kg are based on dry weight

General Electric - Court Street Facility
Lead Sampling Program

Table 2. Grid Based Soil Sample Results
(Collected 7-10-90)

Sample Number	Total Pb (mg/kg)	TCLP Pb (mg/l)	Matrix	Sample Number	Total Pb (mg/kg)	TCLP Pb (mg/l)	Matrix
A-2	350	<0.5	Soil	D-10	640	-	Soil
A-3	420	-	Soil	D-11	93	<0.5	Soil
A-4	550	<0.5	Soil	D-12	100	-	Soil
A-5	650	-	Soil	D-13	98	-	Soil
A-6	1,600	-	Soil	D-14	160	-	Soil
A-7	460	<0.5	Soil	D-15	350	<0.5	Soil
A-8	340	-	Soil	E-1	330	-	Soil
A-9	1,100	-	Soil	E-2	740	<0.5	Soil
A-10	350	<0.5	Soil	E-3	860	-	Soil
B-1	250	-	Soil	E-10	480	<0.5	Soil
B-2	3,000	-	Soil	E-11	89	-	Soil
B-3	6,300	-	Soil	E-12	270	-	Soil
B-4	2,800	-	Soil	E-13	200	-	Soil
B-5	1,000	<0.5	Soil	E-14	160	-	Soil
B-6	1,600	-	Soil	F-2	320	-	Soil
B-7	1,900	-	Soil	F-10	540	-	Soil
B-8	160	-	Soil	F-11	60	-	Soil
B-9	160	<0.5	Soil	F-12	300	<0.5	Soil
B-10	390	-	Soil	F-13	120	-	Soil
C-1	1,300	-	Soil	F-14	120	-	Soil
C-2	920	-	Soil	G-10	220	<0.5	Soil
C-3	2,800	-	Soil	G-11	330	-	Soil
C-4	2,500	-	Soil	G-12	280	-	Soil
C-5	29,000	-	Soil	G-13	220	-	Soil
C-6	9,000	-	Soil	G-14	210	-	Soil
C-7	2,400	<0.5	Soil	H-10	540	-	Soil
C-10	1,300	<0.5	Soil	H-11	520	-	Soil
D-1	290	-	Soil	H-12	240	-	Soil
D-2	32,000	-	Soil	H-13	190	-	Soil
D-3	2,500	<0.5	Soil				

Notes:

1 The units mg/kg are based on dry weight
2 Samples taken at or near surface
3 See Figure G-1 for sample locations

General Electric - Court Street Facility
Lead Sampling Program

Table 3. Catchbasin Sediment Sample Results
(Collected 7-10-90)

Sample Number	Total Pb (mg/kg)	TCLP Pb (mg/l)	Matrix
CB-1	280,000	130	Sediment
CB-2	13,000	0.6	Sediment
CB-3	590	<0.5	Sediment

Notes:
1 The units mg/kg are based on dry weight
2 See Figure G-1 for sample locations

General Electric - Court Street Facility
Lead Sampling Program

Table 4. Roof Vent Dust Sample Result
(Collected 7-10-90)

Sample Number	Total Pb (mg/kg)	TCLP Pb (mg/l)	Matrix
Roof Vent	220,000	-	Dust

Notes:

1 The units mg/kg are based on dry weight
2 See Figure G-1 for sample location
3 Analysis only possible for total Pb due to limited sample material

General Electric - Court Street Facility
Lead Sampling Program

Table 5. Soil Boring Sample Results
(Collected 7-20-90)

Sample Number	Total Pb (mg/kg)	Depth (Inches)	Matrix
A5-A	200	0-6	Soil
A5-B	49	6-12	Soil
A5-C	25	12-24	Soil
A5-D	18	24-36	Soil
A9-A	48	0-6	Soil
A9-B	35	6-12	Soil
A9-C	50	12-24	Soil
A9-D	19	24-36	Soil
B3-A	6,700	0-6	Soil
B3-B	28	6-12	Soil
B3-C	80	12-24	Soil
B3-D	530	24-36	Soil
B7-A	1,300	0-6	Soil
B7-B	33	6-12	Soil
B7-C	20	12-24	Soil
B7-D	20	24-36	Soil
C5-A	9,500	0-6	Soil
C5-B	28	6-12	Soil
C5-C	25	12-24	Soil
C5-D	270	24-36	Soil
D2-A	280	0-6	Soil
D2-B	5,300	6-12	Soil
D2-C	380	12-24	Soil
D2-D	43	24-36	Soil

Notes:
1 The units mg/kg are based on dry weight
2 See Figure G-1 for boring locations
3 Samples from depths 36"-120" retained but not analyzed
4 Split Spoon used to collect samples
5 Boring Logs provided as Appendix C

General Electric - Court Street Facility
Lead Sampling Program

Table 6. Drum and Waste Pile Sample Results
(Collected 7-20-90)

Sample Number	Total Pb (mg/kg)	EPTOX Pb (mg/l)	Matrix
Drum	46	<0.5	Soil
Drum Soil	390	-	Soil
Waste Pile	230	-	Soil

Notes:

1 The units mg/kg are based on dry weight
2 See Figure G-1 for sample locations
3 Drum sample analyzed for EP Toxic Lead
for waste characterization purposes

General Electric - Court Street Facility
Lead Sampling Program

Table 7. Outfall/Stream Sediment Sample Results

Sample Number	Total Pb (mg/kg)	Matrix	Date Collected
Outfall	57,000	Soil	7-20-90
SED-1	60	Sediment	7-26-90
SED-2	94	Sediment	7-26-90
SED-3	110	Sediment	7-26-90

Notes:
1. The units mg/kg are based on dry weight
2. See Figure G-1 for sample locations
3. Samples SED-1 and SED-3 taken 10 feet upstream and 10 feet downstream respectively.
4. Sample Outfall taken from embankment

General Electric - Court Street Facility
Lead Sampling Program

Table 8. Additional Grid Based Soil Sample Results
(Collected 8-25-90)

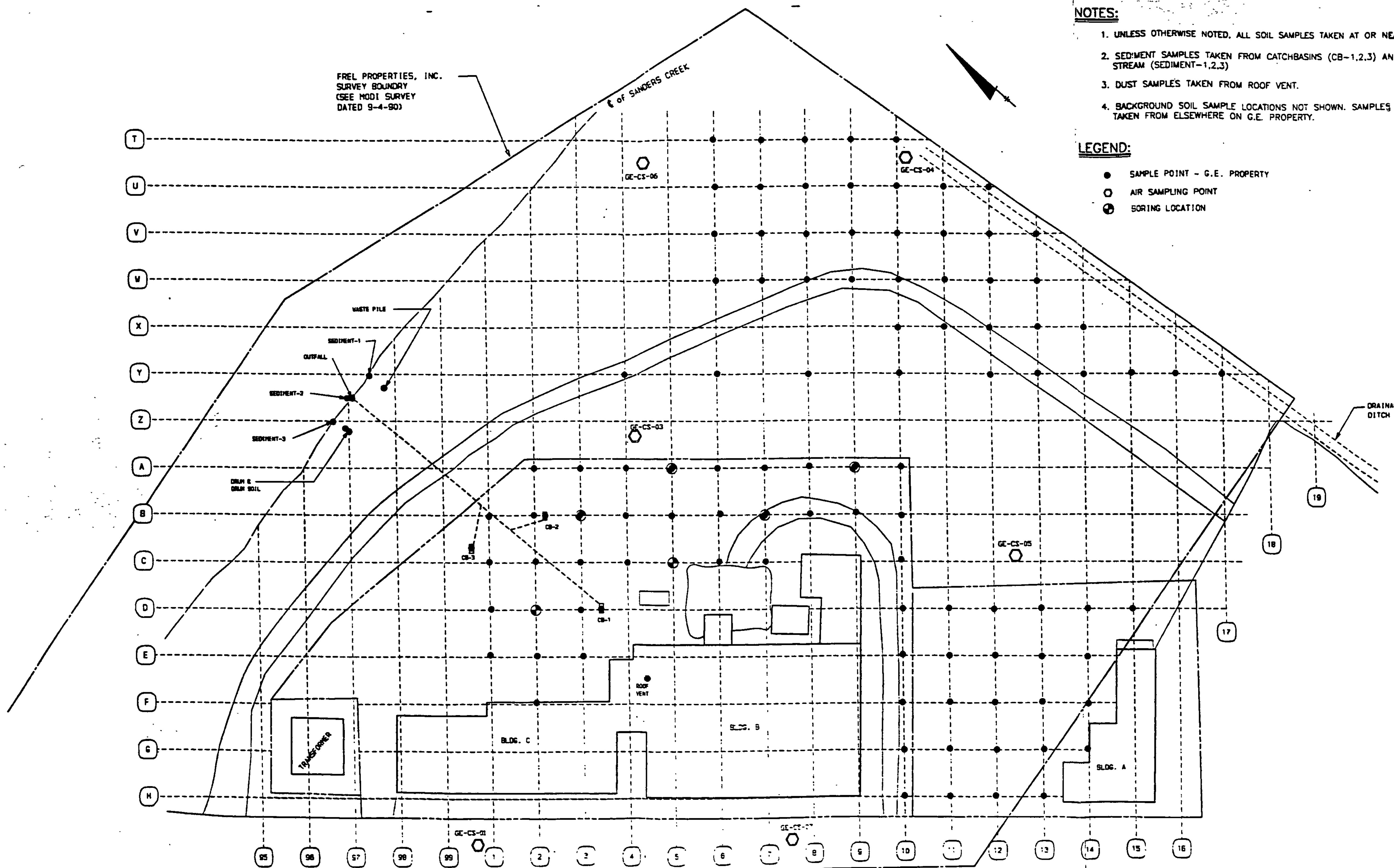
Sample Number	Total Pb (mg/kg)	Matrix
C-12	2100	Soil
C-16	87	Soil
U-8	1000	Soil
U-11	11,000	Soil
V-12	13,000	Soil
W-12	430	Soil
W-13	340	Soil
W-14	110	Soil
X-14	290	Soil
X-16	90	Soil
Y-4	110	Soil
Y-6	88	Soil
Y-8	110	Soil
Y-10	190	Soil
Y-12	190	Soil
Y-16	56	Soil
Y-17	54	Soil
Y-18	200	Soil
Z-18	150	Soil
Z-19	190	Soil

Notes:

1. The units mg/kg are based on dry weight
2. Samples taken at or near surface
3. See Figure G-1 for sample locations

Figures

O'BRIEN & GERE



NOTES:

1. UNLESS OTHERWISE NOTED, ALL SOIL SAMPLES TAKEN AT OR NEAR SURFACE.
2. SEDIMENT SAMPLES TAKEN FROM CATCHBASINS (CB-1,2,3) AND STREAM (SEDIMENT-1,2,3)
3. DUST SAMPLES TAKEN FROM ROOF VENT.
4. BACKGROUND SOIL SAMPLE LOCATIONS NOT SHOWN. SAMPLES WERE TAKEN FROM ELSEWHERE ON G.E. PROPERTY.

LEGEND:

- ● SAMPLE POINT - G.E. PROPERTY
- ○ AIR SAMPLING POINT
- ◕ BORING LOCATION

Designed by JWM	Checked by LVM	Made by JWM	APPROXIMATE SCALE 1"=25'-0" (25 0 25 50)	O'BRIEN & GERE ENGINEERS, INC. Syracuse, New York
GENERAL ELECTRIC COURT STREET FACILITY SYRACUSE, NEW YORK	GENERAL SAMPLE LOCATIONS - G.E. PLAN	FILE NO 2700.029.110	DATE MARCH, 1991	G-1

Appendices

APPENDIX A

LABORATORY REPORTS

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Laboratory Report

NT__ ꓤIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRI General Electric - Soils - Syracuse, NY

DATE COLLECTED 7-10-90 DATE RECEIVED 7-10-90

Description:	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
A-2	K5259	350.	87.		
A-3	K5260	420.	91.		
A-4	K5261	550.	92.		
A-5	K5262	650.	93.		
A-6	K5263	1600.	93.		
A-7	K5264	460.	93.		
A-8	K5265	340.	91.		
A-9	K5266	1100.	91.		
A-10	K5267	350.	92.		
B-1	K5268	250.	92.		
B-2	K5269	3000.	92.		
B-3	K5270	6300.	91.		
B-4	K5271	2800.	88.		
B-5	K5272	1000.	91.		
B-6	K5273	1600.	93.		
B-7	K5274	1900.	93.		
B-8	K5275	160.	91.		
B-9	K5276	160.	92.		
B-10	K5277	390.	93.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: [signature]

Date: August 1, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric - Soils - Syracuse, NY

DATE COLLECTED 7-10-90 DATE RECEIVED 7-10-90

Description :	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
C-1	K5278	1300.	93.		
C-2	K5279	920.	91.		
C-3	K5280	2800.	88.		
C-4	K5281	2500.	90.		
C-5	K5282	29000.	86.		
C-6	K5283	9000.	94.		
C-7	K5284	2400.	93.		
C-10	K5285	1300.	94.		
F-2	K5286	320.	83.		
F-10	K5287	540.	94.		
F-11	K5288	60.	91.		
F-12	K5289	300.	93.		
F-13	K5290	120.	92.		
F-14	K5291	120.	93.		
G-10	K5292	220.	93.		
G-11	K5293	330.	93.		
G-12	K5294	280.	95.		
G-13	K5295	220.	94.		
G-14	K5296	210.	93.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: [signature]

Date: August 1, 1990

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric - Soils - Syracuse, NY

DATE COLLECTED 7-10-90 DATE RECEIVED 7-10-90

Description:	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
H-10	K5297	540.	94.		
H-11	K5298	520.	93.		
H-12	K5299	240.	94.		
H-13	K5300	190.	95.		
D-1	K5301	290.	92.		
D-2	K5302	32000.	92.		
D-3	K5303	2500.	94.		
D-10	K5304	640.	95.		
D-11	K5305	93.	91.		
D-12	K5306	100.	92.		
D-13	K5307	98.	89.		
D-14	K5308	160.	89.		
D-15	K5309	350.	95.		
E-1	K5310	330.	94.		
E-2	K5311	740.	94.		
E-3	K5312	860.	87.		
E-10	K5313	480.	93.		
E-11	K5314	89.	91.		
E-12	K5315	270.	90.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: M. N. Cittadi

Date: August 1, 1990

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric - Soils - Syracuse, NY

DATE COLLECTED 7-10-90 DATE RECEIVED 7-10-90

Description:	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
E-13	K5316	200.	87.		
E-14	K5317	160.	89.		
Vent	K5318	220000.	98.		
CB-1	K5319	280000.	80.		
CB-2	K5320	13000.	78.		
CB-3	K5321	590.	76.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: M. N. Pettinelli

Date: August 1, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric - Soils - Syracuse, NY

DATE COLLECTED 7-10-90 DATE RECEIVED 7-10-90

Description:	Sample #	TCLP LEAD			
A-2	K5322	<0.5			
A-4	K5323				
A-7	K5324				
A-10	K5325				
B-5	K5326				
B-9	K5327				
C-7	K5328				
C-10	K5329				
F-12	K5330				
G-10	K5331				
D-3	K5332				
D-11	K5333				
D-15	K5334				
E-2	K5335				
E-10	K5336				
CB-1	K5337	130.			
CB-2	K5338	0.6			
CB-3	K5339	<0.5			

Comments:

Certification No.: 10155

Units: mg/l

Authorized: [signature]

Date: August 1, 1990

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric, Court Street, Syracuse - Soils

DATE COLLECTED 7-20,23-90 DATE RECEIVED 7-23-90

Description:	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
B3-A	K6465	6700.	91.		
B3-B	K6466	28.	86.		
B3-C	K6467	80.	92.		
B3-D	K6468	530.	95.		
D2-A	K6469	280.	86.		
D2-B	K6470	5300.	92.		
D2-C	K6471	380.	87.		
D2-D	K6472	43.	87.		
A5-A	K6473	200.	93.		
A5-B	K6474	49.	92.		
A5-C	K6475	25.	90.		
A5-D	K6476	18.	88.		
C5-A	K6477	9500.	95.		
C5-B	K6478	28.	89.		
C5-C	K6479	25.	87.		
C5-D	K6480	270.	85.		
A9-A	K6481	48.	91.		
A9-B	K6482	35.	90.		
A9-C	K6483	50.	89.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: Michael K. Pettit

Date: August 1, 1990

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric, Court Street, Syracuse - Soils

DATE COLLECTED 7-20,23-90 DATE RECEIVED 7-23-90

Description:	Sample #	TOTAL LEAD	TOTAL PERCENT SOLIDS		
A9-D	K6484	19.	89.		
Pile-1	K6485	230.	87.		
Drum	K6486	46.	99.		
Drum Spill	K6487	390.	74.		
B7-A	K6488	1300.	94.		
B7-B	K6489	33.	93.		
B7-C	K6490	20.	89.		
B7-D	K6491	20.	89.		
Outfall	K6524	57000.	60.		
B-1	K6525	62.	79.		
B-2	K6526	99.	83.		
B-3	K6527	33.	81.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: Michael K. Perrotti

Date: August 1, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, P.C. JOB NO. 3435.001.080

DESCRIPTION General Electric, Court Street, Syracuse, NY - Soils

DATE COLLECTED 7-26-90 DATE RECEIVED 7-27-90

Description:	Sample #	TOTAL LEAD	PERCENT TOTAL SOLIDS		
SED-U	K6857	60.	73.		
SED-O	K6858	94.	67.		
SED-D	K6859	110.	55.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: [signature]

Date: August 13, 1990

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

Table 8

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric; Court Street, Syracuse, NY - Soils

DATE COLLECTED 8-25-90 DATE RECEIVED 8-27-90

Description	Sample #	TOTAL LEAD	PERCENT TOTAL SOLIDS		
C-16	K8327	87.	81.		
C-12	K8328	2100.	78.		
Z-18	K8329	150.	84.		
Z-19	K8330	190.	84.		
Y-4	K8331	110.	83.		
Y-6	K8332	88.	76.		
Y-8	K8333	110.	85.		
Y-10	K8334	190.	86.		
Y-12	K8335	190.	87.		
Y-16	K8336	56.	91.		
Y-17	K8337	54.	85.		
Y-18	K8338	200.	84.		
X-16	K8339	90.	86.		
X-14	K8340	290.	86.		
W-12	K8341	430.	83.		
W-13	K8342	340.	84.		
W-14	K8343	110.	86.		
U-8	K8344	1000.	86.		
U-11	K8345	11,000.	85.		
V-12	K8346	13,000.	85.		

Comments:

Certification No.: 10155

Units: mg/kg dry weight

Authorized: [signature]

Date: September 12, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

OBG LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.100

DESCRIPTION GE - Court Street, Syracuse, NY - Air Samples

DATE COLLECTED 8-29-90 DATE RECEIVED 8-29-90

Description:	Sample #	TOTAL LEAD			
GE-CS-01	K8616	<0.5			
GE-CS-02	K8617	<0.5			
GE-CS-03	K8618	<0.5			
GE-CS-04	K8619	<0.5			
GE-CS-05	K8620	<0.5			
GE-CS-06	K8621	<0.5			
GE-CS-07	K8622	<0.5			
GE-CS-08	K8623	<0.5			
GE-CS-09	K8624	<0.5			

Comments:

Certification No.: 10155

Units: Total µg

Authorized: Michael N. Pettinelli

Date: September 11, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.080

DESCRIPTION General Electric, Court Street, Syracuse, NY

Additional Analysis as requested by Client on 7-27-90

DATE COLLECTED 7-20,23-90 DATE RECEIVED 7-23-90

Description:	Sample #	EPTOX LEAD			
Drum	K6856	<0.5			

Comments:

Certification No.: 10155

Units: mg/l

Authorized: [signature]

Date: August 21, 1990

OBG Laboratories, Inc., *an O'Brien & Gere Limited Company*
5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

APPENDIX B

CHAIN OF CUSTODY REPORTS

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

☆ ANALYZIE FOR LEACHABLE Pb BY TCLP also

QUESTIONIES – Lowell McBURNEY X 363

SURVEY: GENERAL ELECTRIC Syracuse	SAMPLERS: (Signature) Jeff Mullen, Bill Chase

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
A-2		7-10-90						1	TOTAL Pb ☆
A-3								1	
A-4								1	☆
A-5								1	
A-6								1	
A-7								1	☆
A-8								1	
A-9								1	
A-10								1	☆
B-1								1	
B-2								1	
B-3								1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Muller		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/10/90 0905

Method of Shipment:

☆ ANALYIZE FOR LEACHABLE Pb ALSO

~~AND~~

QUESTIONES — Lowell McBurney X363

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY:	SAMPLERS: (Signature)
G.E SYRACUSE	Jeff Muller

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
-4		7-10-90						1	TOTAL Pb
-5								1	☆
6								1	
B-7								1	
8								1	
-9								1	☆
-10								1	
1								1	
C-2								1	
3								1	
C-4								1	
-5								1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Muller		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		[signature] Barnes	7/10/90 0905

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

☆ ANALYIZE FOR LEACHABLE Pb by TCLP ALSO

QUESTIONES – Lowell McBORNEY X.363

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)
G.E. Syracuse	Jeffrey W Muller

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
F-2		7-10-90						1	TOTAL Pb
F-10								1	
F-11								1	
F-12								1	☆
F-13								1	
F-14								1	
G-10								1	☆
G-11								1	
G-12								1	
G-13								1	
G-14								1	
H-10								1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Muller		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Dan Barnes	7/10/90 0905

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

☆ ANALYZE FOR LEACHABLE Pb ALSO

QUESTIONES - Lowell Mc Burney X363

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY: G.E. Syracuse

SAMPLERS: (Signature) Jeff Mullen

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	SAMPLE TYPE Water Grab	SAMPLE TYPE Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
D-1		7-10-90						1	Total Pb
D-2								1	
D-3								1	☆
D-10								1	
D-11								1	☆
D-12								1	
D-13								1	
D-14								1	
D-15								1	☆
E-1								1	
E-2								1	☆
E-3								1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Mullen		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/10/90 0905

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

OBG LABORATORIES, INC.

☆ ANALYIZE FOR LEACHABLE Pb by TCLP

Questiones - Lowell McBurney x 363

CHAIN OF CUSTODY RECORD

SURVEY

SAMPLERS: (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
H-1		7-10-90							TOTAL Pb
H-12		↓							↓
H-13		↓							↓
H-14		↓							↓

Relinquished by: (Signature) Jeffrey W Muller	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) Date/Time	Received for Laboratory by: Ann Barnes	Date/Time 7/10/90 0905

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

☆ ANALYZE FOR LEACHABLE Pb by TCLP ALSO

QUESTIONS Lowell Mc BURNEY
x 363

LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY: G.E. Syracuse

SAMPLERS: (Signature) Jeff Mullen

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	SAMPLE TYPE Water Grab	SAMPLE TYPE Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
E-10		7-10-90							TOTAL Pb ☆
E-11									
E-12									
E-13									
E-14									
E-15									
VENT									
CB-1									☆
CB-2									☆
CB-3									☆

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Mullen		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Dun Barnes	7/11/90 0905

Method of Shipment:

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

RUSH 1WEEK

SURVEY: General Electric . Court Street Syr.

SAMPLERS: (Signature) Jeffrey W. Mullen

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	SAMPLE TYPE Water Grab	SAMPLE TYPE Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
B3-A		7-20-90						1	TOTAL Pb
B3-B		↓						1	↓
B3-C								1	
B3-D								1	
D2-A								1	
D2-B								1	
D2-C								1	
D2-D								1	
A5-A								1	
A5-B								1	
A5-C								1	
A5-D		↓						1	↓

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W. Mullen		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/23/90 0945

Method of Shipment:

OBG LABORATORIES, INC.

RUSH 1 WEEK

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)
GENERAL ELECTRIC COURT STREET SYR.	Jeffrey W Muller

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
C5-A		7-20-90						1	TOTAL Pb
C5-B		↓						1	↓
C5-C								1	
C5-D								1	
A9-A								1	
A9-B								1	
A9-C								1	
A9-D								1	
PILE-1								1	
DRUM								1	
DRUM SPILL		↓						1	↓

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Muller		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/23/90 0945

Method of Shipment:

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

A BRIEF DESCRIPTION OF THE UNIFIED SOIL SYSTEM

The Unified Classification System is an engineering soil classification that is an outgrowth of the Air-Field classification developed by Casagrande.

The system incorporates the textural characteristics of a soil into the engineering classification. All soils are classified into fifteen groups, each group being designated by two letters. These letters are as follows: G—gravel, S—sand, M—Non plastic or low plasticity fines, C—plastic fines, Pt—peat, humus and swamp soils, O—organic, W—well graded, P—poorly graded, L—low liquid limit, H—high liquid limit.

GW and SW Groups

These groups comprise well graded gravelly and sandy soils which contain less than 5% of non plastic fines passing a #200 sieve. Fines which are present must not noticeably change the strength characteristics of the coarse grain fraction and must not interfere with its free draining characteristics. In areas subject to frost action the material should not contain more than about 3% of soil grains smaller than .02 millimeters in size.

GP and SP Groups

These groups are poorly graded gravels and sands containing less than 5% non plastic fines. They may consist of uniform gravels, uniform sands, or non uniform mixtures of very coarse material and very fine sand with intermediate sizes lacking. Materials of this latter type are sometimes referred to as skip graded, cap graded, or step graded.

GM and SM Groups

In general, these groups include gravels or sands which contain more than 12% of fines having little or no plasticity. The plasticity index and liquid limit of a soil in either of these groups plot below the "A" line on a plasticity chart. Gradation is not important and both low grade and poorly graded materials are included. Some sands and gravels in these groups may have a binder composed of natural cementing agents so proportioned that the mixture shows negligible swelling or shrinkage. Thus, the dry strength is provided by a small amount of soil binder or dry cementation of calcareous materials or iron oxide. A fine fraction of non cemented materials may be composed of silts or rock flour types having little or no plasticity, and the mixture will exhibit no dry strength.

GC and SC Groups

These groups comprise gravelly or sandy soils with more than 12% of fines which exhibit either low or high plasticity. The plasticity index and liquid limit of a soil in either of these groups plot above the "A" line on the plasticity chart. Gradation of these materials is not important. Plasticity of the binder fraction has more influence on the behavior of the soils than does the variation in gradation. A fine fraction is generally composed of clays.

ML and MH Groups

These groups include predominantly silty materials and micaceous or diatomaceous soils. An arbitrary division between the two groups has been established with a liquid limit of 50. Soils in these groups are sandy silts, clayey silts or organic silts with relatively low plasticity. Also included are loessial soils and rock flours. Micaceous and diatomaceous soils generally fall within the MH group, but may extend into the ML group when their liquid limit is less than 50. The same is true for certain types of kaolin clays and some illite clays having relatively low plasticity.

CL and CH Groups

The CL and CH groups embrace clays with low and high liquid limits respectively. They are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays, and silty clays. The medium plasticity and high plasticity clays are classified as CH. These include fat clays, gumbo clays, certain volcanic clays and bentonite.

OL and OH Groups

The soils in these groups are characterized by the presence of organic matter including organic silts and clays. They have a plasticity range that corresponds with the ML and MH groups.

Pt Group

Highly organic soils which are very compressible have undesirable construction characteristics and are classified in one group with the symbol Pt. Peat, humus and swamp soils with a highly organic texture are typical of the group. Particles of leaves, grass, branches of bushes and other fibrous vegetable matter are common components of these soils.

Borderline Classification

Soils in the GW, SW, GP and SP groups are non plastic materials having less than 5% passing the #200 sieve, while GM, SM, GC, and SC soils have more than 12% passing the #200 sieve. When these coarse grain materials contain between 5% and 12% of fines they are classified as borderline, and are designated by the dual symbol such as GW-GM. Similarly coarse grain soils which have less than 5% passing the #200 sieve, but which are not free draining or in which the fine fraction exhibits plasticity are also classed as borderline and are given a dual symbol. Still another type of borderline classification occurs when a liquid limit of a fine grain soil is less than 29 and the plasticity index lies in the range of four to seven. These limits are indicated by the shaded area on the plasticity chart.

Silty and Clayey

In the Unified System, these terms are used to describe soils whose Atterberg limits plot below and above the "A" line on the plasticity chart. The adjectives silty and clayey are used to describe soils whose limits plot close to the "A" line.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

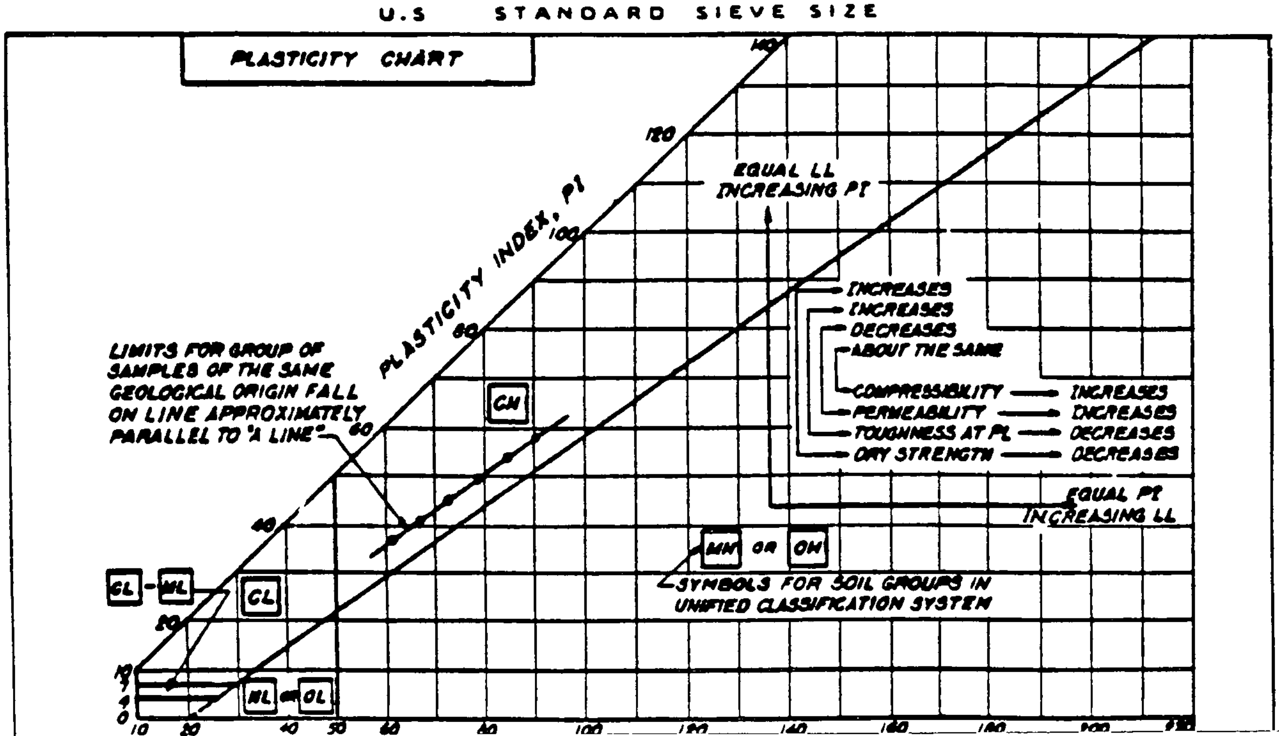
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

No. 200 No. 40 No. 10 No. 4 ¾ in. 3 in. (12 in.)

U.S STANDARD SIEVE SIZE



parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: General Electric Court Street Plant
LOCATION: Syracuse, New York
DATE STARTED: 7/20/90   DATE COMPLETED: 7/20/90

HOLE NO. A-5-90-514
SURF. EL.
JOB NO. 90205
GROUND WATER DEPTH
WHILE DRILLING 4.0'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Hole caved at 1.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		7/9		Red-brown moist very stiff SILT,	
	2.0'			9/10	18	little fine to coarse gravel	1.8'
	2.0'-	2		15/15		Tan moist very stiff to hard SILT,	
WL ▽	4.0'			15/15	30	little fine sand	4.0'
5.0	4.0'-	3		4/2		Red-brown moist to wet medium stiff	
	6.0'			2/3	4	to stiff SILT, some clay, trace fine	
	6.0'-	4		1/2		sand	
	8.0'			2/2	4		
	8.0'-	5		3/5			
10.0	10.0'			6/4	11		
						Bottom of Boring	10.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT
LOCATION
General Electric Court Street Plant
Syracuse, New York

HOLE NO. A-9-90-515
SURF. EL.

DATE STARTED 7/20/90 DATE COMPLETED 7/20/90

JOB NO. 90205

GROUND WATER DEPTH
WHILE DRILLING 4.0'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED 1.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		15/14		Red-brown moist very stiff SILT, some	
	2.0'			15/14	29	fine to coarse gravel	1.8'
	2.0'-	2		19/14		Tan moist medium dense to loose fine	
WL	4.0'			14/14	28	to coarse SAND and SILT, trace clay	
5.0	4.0'-	3		15/4			
	6.0'			2/2	6		6.0'
	6.0'-	4		3/2		Gray-brown wet soft to medium stiff	
	8.0'			2/2	4	SILT and CLAY	
	8.0'-	5		8/4			
10.0	10.0'			4/2	8		
						Bottom of Boring	10.0'

perratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT General Electric Court Street Plant

LOCATION Syracuse, New York

HOLE NO. B-3-90-516

SURF. EL.

DATE STARTED 7/20/90 DATE COMPLETED 7/20/90

JOB NO. 90205

GROUND WATER DEPTH
WHILE DRILLING 4.0'

BEFORE CASING REMOVED Dry

AFTER CASING REMOVED Hole caved at 2.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		7/10		Red-brown moist very stiff SILT and fine to coarse GRAVEL, trace fine to coarse sand	
	2.0'			9/12	19		
	2.0'-	2		12/12			1.8'
WL ▽	4.0'			13/15	25	Red-brown moist very stiff SILT, trace clay	
5.0	4.0'-	3		3/3			4.0'
	6.0'			3/4	6	Red-brown wet medium stiff to stiff to soft SILT and CLAY	
	6.0'-	4		3/6			
	8.0'			3/7	9		
	8.0'-	5		4/2			
10.0	10.0'			1/1	3		
						Bottom of Boring	10.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT	General Electric Court Street Plant	HOLE NO.	B-7-90-517
LOCATION	Syracuse, New York	SURF. EL.	
DATE STARTED	7/20/90 DATE COMPLETED 7/20/90	JOB NO.	90205

GROUND WATER DEPTH
WHILE DRILLING 3.5'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED 6.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		15/27		Red-brown moist hard SILT, some fine to coarse gravel, trace fine to coarse sand	
	2.0'			28/24	55		
WL	2.0'-	2		15/14			3.0'
	4.0'			15/14	29	Red-brown wet very stiff to medium stiff SILT, trace fine sand	
5.0	4.0'-	3		5/4			
	6.0'			4/5	8		
	6.0'-	4		3/2			6.5'
	8.0'			1/2	3	Red-gray wet soft SILT, some clay	
	8.0'-	5		4/2			
10.0	10.0'			2/1	4		
						Bottom of Boring	10.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT General Electric Court Street Plant
LOCATION Syracuse, New York
DATE STARTED 7/20/90 DATE COMPLETED 7/20/90

HOLE NO. C-5-90-518
SURF. EL.
JOB NO. 90205
GROUND WATER DEPTH
WHILE DRILLING 4.5'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Hole caved at 1.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		17/14		Red-brown moist very stiff SILT,	
	2.0'			14/7	28	little fine to coarse gravel	2.0'
	2.0'-	2		9/7		Red-brown moist stiff SILT, some clay,	
	4.0'			6/5	13	little fine sand	4.0'
5.0	4.0'-	3		3/1		Gray-red moist to wet soft SILT and	
WL	6.0'			2/3	3	CLAY, trace fine to coarse gravel	
	6.0'-	4		2/1			
	8.0'			2/3	3		8.0'
	8.0'-	5		8/3		Gray moist medium stiff CLAY, trace	
10.0	10.0'			2/3	5	silt	
						Bottom of Boring	10.0'

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT: General Electric Court Street Plant
LOCATION: Syracuse, New York
HOLE NO. D-2-90-519
SURF. EL.
DATE STARTED 7/20/90 DATE COMPLETED 7/20/90
JOB NO. 90205

GROUND WATER DEPTH
WHILE DRILLING 3.5'
BEFORE CASING REMOVED Dry
AFTER CASING REMOVED Hole caved at 2.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER
DRILLER'S FIELD LOG

SHEET 1 OF 1
File #2700.029

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N
	0.0'-	1		14/21	
	2.0'			10/8	31
WL ▼	2.0'-	2		10/8	
	4.0'			10/9	18
5.0	4.0'-	3		2/1	
	6.0'			1/3	2
	6.0'-	4		2/3	
	8.0'			4/7	7
	8.0'-	5		1/1	
10.0	10.0'			1/1	2

DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
Red-brown moist dense fine to coarse GRAVEL and SILT, little fine to coarse sand	1.8'
Red-brown moist very stiff SILT and fine to coarse SAND, little fine to coarse gravel	4.0'
Red-brown wet very soft CLAY, some silt	7.5'
Red-brown moist loose fine to coarse GRAVEL and SILT	8.0'
Red-brown moist to wet very soft CLAY, some silt	
Bottom of Boring	10.0'

APPENDIX D

REPORT - GEOPHYSICAL SURVEY

GEOPHYSICAL SURVEYS
GENERAL ELECTRIC CORPORATION
COURT STREET FACILITY
SYRACUSE, NEW YORK

OCTOBER, 1990

PREPARED BY:

O'BRIEN & GERE ENGINEERS, INC.
SYRACUSE, NEW YORK

PROJECT OBJECTIVE

Geophysical surveys were performed at the General Electric Company (GE), Syracuse, New York Court Street Site over a period extending from September 5 through September 10, 1990. Electromagnetic (EM) and magnetic methods were used to assess whether non-native subsurface metallic materials are present at the Site.

INVESTIGATION METHODS

The geophysical surveys were performed on an established site-wide grid with a spacing of 25 feet between grid nodes (Figures 1 - 3). A Geonics EM-31 Terrain Conductivity Meter was used to assess shallow subsurface soil conductivities which were used to identify conductivity anomalies within natural soils and filled materials. An EG&G Model 846 Proton Magnetometer was used to detect the general presence of subsurface ferrous materials. Resulting EM conductivity and magnetic data are illustrated on Figures 1 and 2, respectively.

Additionally, localized areas of elevated conductivity values noted during the conductivity and magnetic surveys were also evaluated using the EM-31 operated and calibrated for in the in-phase mode. In the in-phase operative mode, the EM-31 is particularly sensitive to the presence of metallic materials, and has been shown to detect sub-grade metallic containers at depths of up to 12 feet. Anomalous areas defined by this survey were staked in the field to facilitate subsequent investigative/excavation efforts, and are illustrated on Figure 3.

SURVEY RESULTS

Results of the conductivity survey indicate that there are three anomalous areas between the fence and the drainage ditch (Figure 1). An area approximately 70 feet by 40 feet is evident by the closed conductivity contours between lines 8 and 11, and U and W. This area was subsequently identified by long time GE employees as an area where ferrous objects may have been previously buried. A second linear anomaly, located along line 13 between the fence and lines A/Z, is most likely a buried pipe or wire. GE employees have suggested that this may be an old grounding wire once attached to Building A. The third point-source anomaly identified by the conductivity survey is located at the intersection of lines B and 16.

The results of the magnetometer survey confirm the anomaly detected by the conductivity survey between lines 9 and 11, and V and W, by the observed deflection of the magnetic contour at that location (Figure 2).

Figure 3 illustrates the locations of anomalies detected by the EM-31 in the in-phase mode of operation. Quantitative data are not obtained by this technique, rather areas of interest are identified by positive or negative meter needle deflections. In this manner, anomalies were detected at the location of the 'grounding wire', as previously discussed, and at three additional locations identified on Figure 3.

Results of the terrain conductivity survey and magnetic survey indicate that a fairly large anomalous area is present between lines 8 and 11, and U and W (Figures 1 and 2). However, the EM-31 operated in the in-phase mode was unable to confirm the presence of buried metallic objects in this area (Figure 3). The interpretation of these data could suggest that a trench containing a quantity of metallic materials may have been placed at this location. However, the metallic materials are either at considerable depth, or are not very voluminous.

The anomaly located along line 13, between the fence and line A (Figures 1 and 2) is likely to be a grounding wire or metal pipe. This object is interpreted as being near surface, as indicated by the responses obtained during the in-phase survey.

Point-source anomalies were identified by the conductivity survey at the intersection of lines B and 16, and by the EM-31 in-phase survey at the intersections of lines 6 and U, lines 6 and V, and lines 98 and Z. These anomalies are considered limited in areal extent, depth, and volume, and most likely represent discrete, singular buried metallic objects.

LABORATORIES, INC.

ROSH 1 WEEK

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)
GE - Court Str. Syracuse	Jeffrey W Mullen

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Water Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
B7-A		7-20-90						1	TOTAL Pb
B7-B								1	
B7-C								1	
B7-D								1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Mullen		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for Field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/23/90 0945

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

Rush
1 week

LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY GE Court Street Rd Syr				SAMPLERS: (Signature) Jeffrey W Muller					
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
Outfall		7-23-90							TOTAL Pb
B-1		↓							↓
B-2									
B-3									

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Jeffrey W Muller		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	7/23/90 0250

Method of Shipment:

Please RUSH

Results to Lowell McBurney

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)
GE, Court St.	David A. Lindstrand (David A. Lindstrand)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
1	C-16	8-25-90		Soil		1	Total Lead
2	C-12						
3	Z-18						
4	Z-19						
5	Y-4						
6	Y-6						
7	Y-8						
8	Y-10						
9	Y-12						
10	Y-16						
11	Y-17						
12	Y-18						

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
David A. Lindstrand	Sean E. Woolbright	8/25 5:24
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

Please RUSH

Results to Lowell McBurney

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY: GE, Court St.

SAMPLERS: (Signature) [signature] (David A. Lindstrand)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE Water Comp.	SAMPLE TYPE Water Grab	SAMPLE TYPE Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
13	X-16	8-25-90			Soil			1	Total Lead
14	X-14	|			|			|	|
15	W-12	|			|			|	|
16	W-13	|			|			|	|
17	W-~~13~~ 14	|			|			|	|
18	U-8 (You-8)	|			|			|	|
19	U-11 (You-11)	|			|			|	|
20	V-12 (Vee-12)	|			|			|	|

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
[signature]	[signature]	8/25 5:24
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Ann Barnes	8/27/90 880

Method of Shipment:

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY	SAMPLERS: (Signature)
GE Court Street	Linda Lathner Rotondo

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	GE-CS-01	8/29							NIOSH 7300
	GE-CS-02								
	GE-CS-03								
	GE-CS-04								
	GE-CS-05								
	GE-CS-06								
	GE-CS-07								
	GE-CS-08								
	GE-CS-09								
	Media Blank								

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Linda Lathner Rotondo		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
		Wendy Smith	8/29/90 11:40

Method of Shipment:

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
5000 Brittonfield Parkway / Suite 300 / PO Box 4942 / Syracuse, NY 13221 / (315) 437-0200

APPENDIX C

BORING LOGS

TEST BORINGS

GENERAL ELECTRIC COURT STREET PLANT

SYRACUSE, NEW YORK

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429
FAX 315/437-1770

August 7, 1990

O'Brien and Gere Engineers, Inc.
5000 Brittonfield Parkway
P.O. Box 4873
Syracuse, New York 13221

Attention: Mr. Lowell McBurney

Re: 90205
General Electric Court Street Plant
Syracuse, New York
File #2700.029

Gentlemen:

Enclosed are driller's field logs of six test borings made for you for the above project.

Soil samples from these borings were retained by your representative at the job site.

The borings were located in the field by you. Drilling and sampling was done in accordance with ASTM method D-1586 for split barrel sampling in soils.

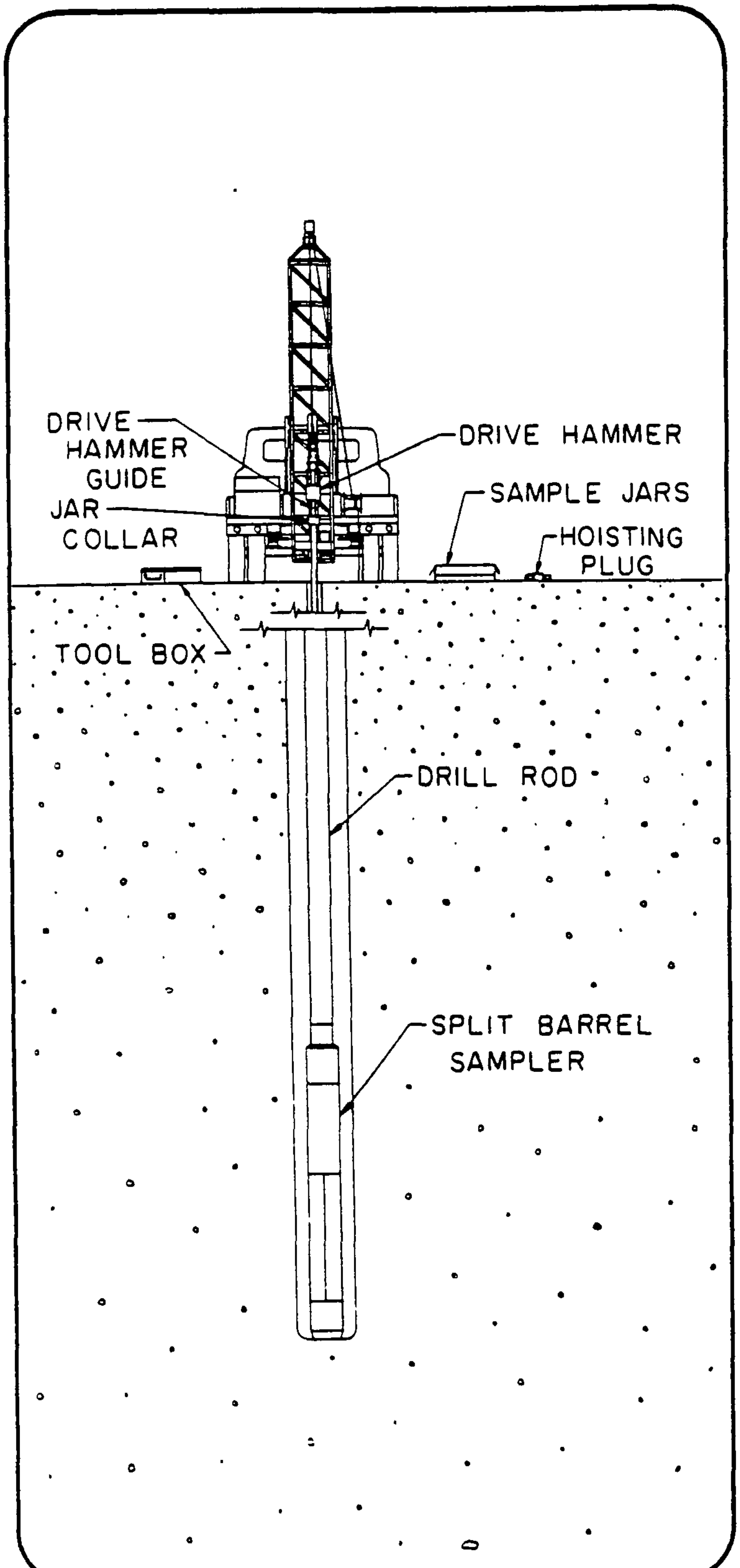
Thank you for this opportunity to work with you.

Very truly yours,

PARRATT - WOLFF, INC.

Steffen Wolff
SW/lc
encs:

parratt wolff inc
FISHER RD., EAST SYRACUSE, N Y 13057
TELEPHONE AREA CODE 315/437-1429



Split barrel sampling

The following excerpts are from "Standard Method for penetration test and split-barrel sampling of soils."[1] (ASTM designation: D-1586-67 AASHO Designation: T-206-70.)

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain respresentative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

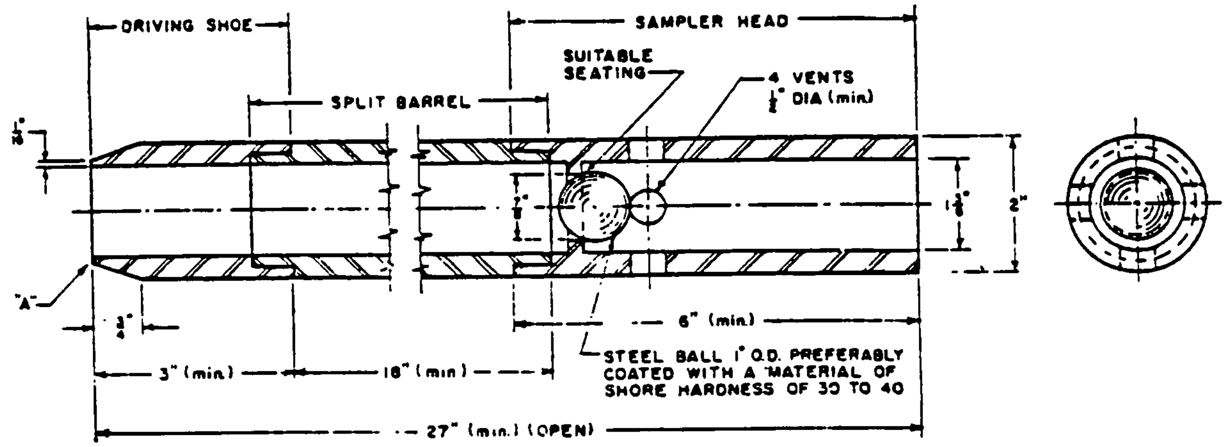
2.1 Drilling Equipment – Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. *Procedure.* To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of 1-5/8 in. or 41.2 mm and an inside diameter of 1-1/8 in. or 28.5 mm, through which the rotary motion of drilling is transferred from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15m). The hole shall be limited in diameter to between 2-1/4 and 6 in. (57.2 and 152mm).

2.2 Split-Barrel Sampler – The sampler shall be constructed with the dimensions indicated (in Fig. 1.) The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four 1/2-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 Drive Weight Assembly – The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 Accessory Equipment – Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

SOIL SAMPLING METHODS



Note 1 – Split barrel may be 1-1/2 in. inside diameter provided it contains a liner of 16-gage wall thickness.

Note 2 – Core retainers in the driving shoe to prevent loss of sample are permitted.

Note 3 – The corners at A may be slightly rounded.

Table of Metric Equivalents.

In.	Mm	Cm	In.	Mm	Cm
1/16 (16 gage)	1.5	. . .	2	. . .	5.08
1/2	12.7	. . .	3	. . .	7.62
3/4	19.0	1.90	6	. . .	15.24
7/8	22.2	2.22	18	. . .	45.72
1-3/8	34.9	3.49	27	68.58	
1-1/2	38.1	3.81			

Fig. 1 – Standard Split Barrel Sampler Assembly

3. Procedure

3.1 Clear out the hole to sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts withdraw the drill bit slowly to prevent loosening of the soil around the hole. Maintain the water level in the hole at or above ground water level.

3.2 In no case shall a bottom-discharge bit be permitted. (Side-discharge bits are permissible.) The process of jetting through an open-tube sampler and then sampling when the desired depth is reached shall not be permitted. Where casing is used, it may not be driven below sampling elevation. Record any loss of circulation or excess pressure in drilling fluid during advancing of holes.

3.3 With the sampler resting on the bottom of the hole, drive the sampler with blows from the 140-lb (63.5 kg) hammer falling 30 in. (0.76 m) until either 18 in. (0.45 m) have been penetrated or 100 blows have been applied.

3.4 Repeat this operation at intervals not longer than 5 ft (1.5 m) in homogeneous strata and at every change of strata.

3.5 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fractions thereof. The first 6 in. (0.15 m) is considered to be a seating drive. The number of blows required for the second and third 6 in. (0.15 m) of penetration added is termed the penetration resistance, N. If the sampler is driven less than 18 in. (0.45 m), the penetration resistance is that for the last 1 ft (0.30 m) of penetration (if less than 1 ft (0.30 m) is penetrated, the logs shall state the number of blows and the fraction of 1 ft (0.30 m) penetrated).

3.6 Bring the sampler to the surface and open. Describe carefully typical samples of soils recovered as to composition, structure, consistency, color, and condition; then put into jars without ramming. Seal them with wax or hermetically seal to prevent evaporation of the soil moisture. Affix labels to the jar or make notations on the covers (or both) bearing job designation, boring number, sample number, depth penetration record, and length of recovery. Protect samples against extreme temperature changes.

4. Report

4.1 Data obtained in borings shall be recorded in the field and shall include the following:

4.1.1 Name and location of job,

4.1.2 Date of boring – start, finish,

4.1.3 Boring number and coordinate, if available,

4.1.4 Surface elevation, if available,

4.1.5 Sample number and depth,

4.1.6 Method of advancing sampler, penetration and recovery lengths,

4.1.7 Type and size of sampler,

4.1.8 Description of soil,

4.1.9 Thickness of layer,

4.1.10 Depth to water surface; to loss of water; to artesian head; time at which reading was made,

4.1.11 Type and make of machine,

4.1.12 Size of casing, depth of cased hole,

4.1.13 Number of blows per 6 in. (0.15 m)

4.1.14 Names of crewmen, and

4.1.15 Weather, remarks.

---

[1]Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-18 on Soil and Rock for Engineering Purposes. A list of members may be found in the ASTM Year Book.

Current edition accepted October 20, 1967. Originally issued, 1958. Replaces D-1586-64T.

parratt wolff inc

FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GENERAL NOTES

1. Soil boring logs, notes and other data shown are the results of personal observations and interpretations made by Parratt-Wolff, Inc.

Exploration records prepared by our drilling foreman in the field form the basis of all logs, and samples of subsurface materials retained by the driller are observed by technical personnel in our laboratory to check field classifications.

2. Explanation of the classifications and terms:

a. Bedrock — Natural solid mineral matter occurring in great thickness and extent in its natural location. It is classified according to geological type and structure (joints, bedding, etc.) and described as solid, weathered, broken or fragmented depending on its condition.

b. Soils — Sediments or other unconsolidated accumulations of particles produced by the physical and chemical disintegration of rocks and which may or may not contain organic matter.

PENETRATION RESISTANCE

COHESIONLESS SOILS		*COHESIVE SOILS*	
Blows Per Ft.	Relative Density	Blows Per Ft.	Consistency
0 to 4	Very Loose	0 to 2	Very Soft
4 to 10	Loose	2 to 4	Soft
10 to 30	Medium Dense	4 to 8	Medium Stiff
30 to 50	Dense	8 to 15	Stiff
Over 50	Very Dense	15 to 30	Very Stiff
		Over 30	Hard

Size Component Terms

Boulder	Larger than 8 inches	
Cobble	8 inches to 3 inches	
Gravel — coarse	3 inches to 1 inch	
— medium	1 inch to 3/8 inch	
— fine	3/8 inch to 4.76 mm	
Sand — coarse	4.76 mm to 2.00 mm	(#10 sieve)
— medium	2.00 mm to 0.42 mm	(#40 sieve)
— fine	0.42 mm to 0.074 mm	(#200 sieve)
Silt and Clay	Finer than 0.074 mm	

Proportion By Weight

Major component is shown with all letters capitalized.

Minor component percentage terms of total sample are:

and	35 to 50 percent
some	20 to 35 percent
little	10 to 20 percent
trace	1 to 10 percent

c. Gradation Terms — The terms coarse, medium and fine are used to describe gradation of Sand and Gravel.

d. The terms used to describe the various soil components and proportions are arrived at by visual estimates of the recovered soil samples. Other terms are used when the recovered samples are not truly representative of the natural materials, such as soil containing numerous cobbles and boulders which cannot be sampled, thinly stratified soils, organic soils, and fills.

e. Ground water — The measurement was made during exploration work or immediately after completion, unless otherwise noted. The depth recorded is influenced by exploration methods, soil type and weather conditions during exploration. Where no water was observed it is so indicated. It is anticipated that the ground water will rise during periods of wet weather. In addition, perched ground water above the water levels indicated (or above the bottom of the hole where no ground water is indicated) may be encountered at changes in soil strata or top of rock.

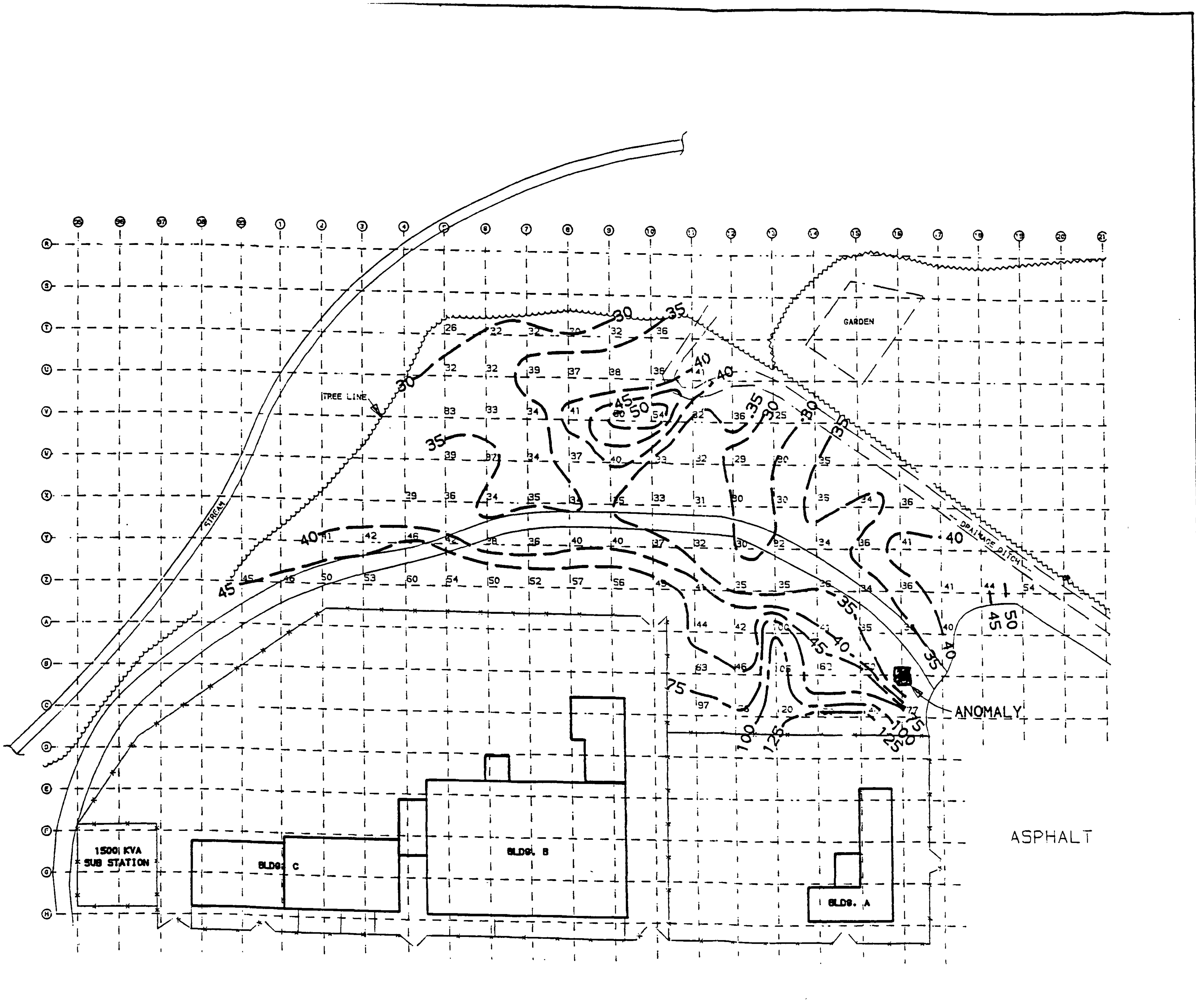


FIGURE I

GENERAL ELECTRIC
COURT STREET FACILITY
SYRACUSE, NEW YORK

LEGEND

5 MMHOS/M TERRAIN CONDUCTIVITY CONTOUR

25 MMHOS/M TERRAIN CONDUCTIVITY CONTOUR

30 TERRAIN CONDUCTIVITY (MMHOS/M)

TERRAIN CONDUCTIVITY MAP

0 60 120
HORIZ. SCALE IN FEET

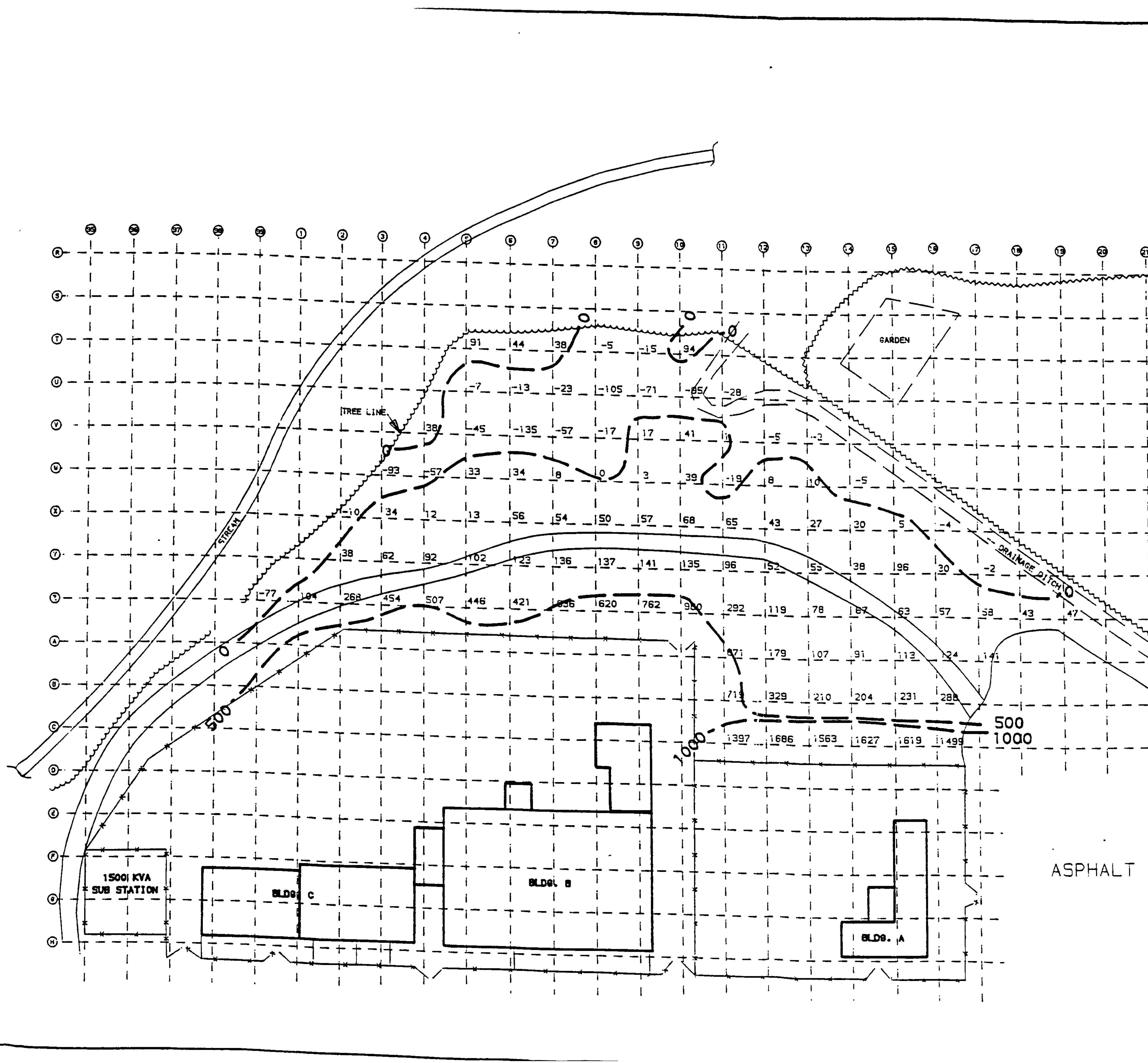
2700.029.113

O'BRIEN & GERE ENGINEERS, INC.

19 OCT 1987

FIGURE 2

GENERAL ELECTRIC
COURT STREET FACILITY
SYRACUSE, NEW YORK



LEGEND

MAGNETIC CONTOUR

47 DEVIATION (IN GAMMAS) FROM BASE STATION

MAGNETOMETER SURVEY MAP
(DATA ADJUSTED TO REFLECT DEVIATION IN GAMMAS FROM BASE STATION DATA)

0 60 120
HORIZ. SCALE IN FEET

2700.029.13

O'BRIEN & GERE ENGINEERS, INC.

19 OCT 1990

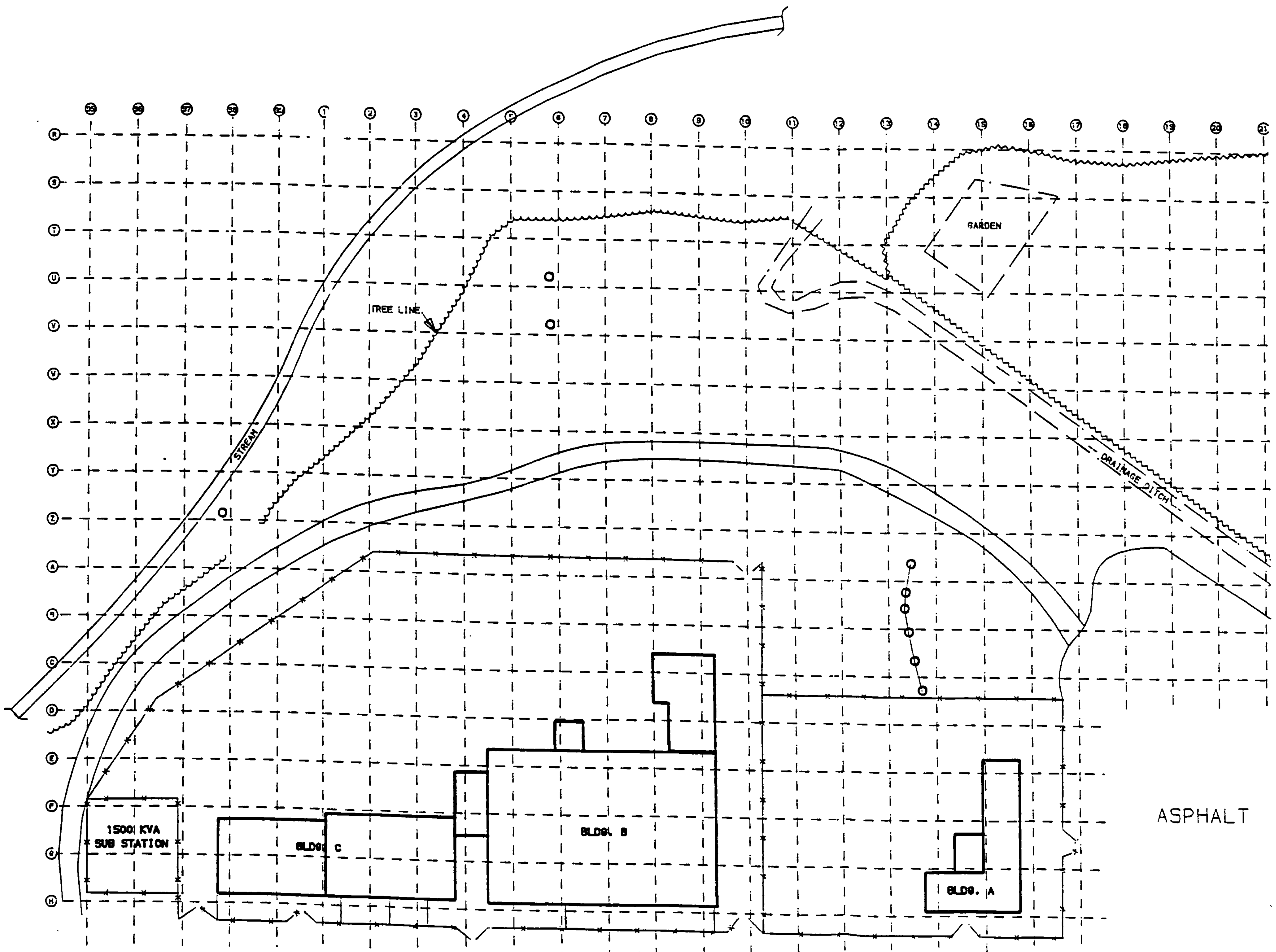


FIGURE 3

GENERAL ELECTRIC
COURT STREET FACILITY
SYRACUSE, NEW YORK

LEGEND

o ANOMALY

IN PHASE EM-31
SURVEY MAP

0 60 120

HORIZ. SCALE IN FEET

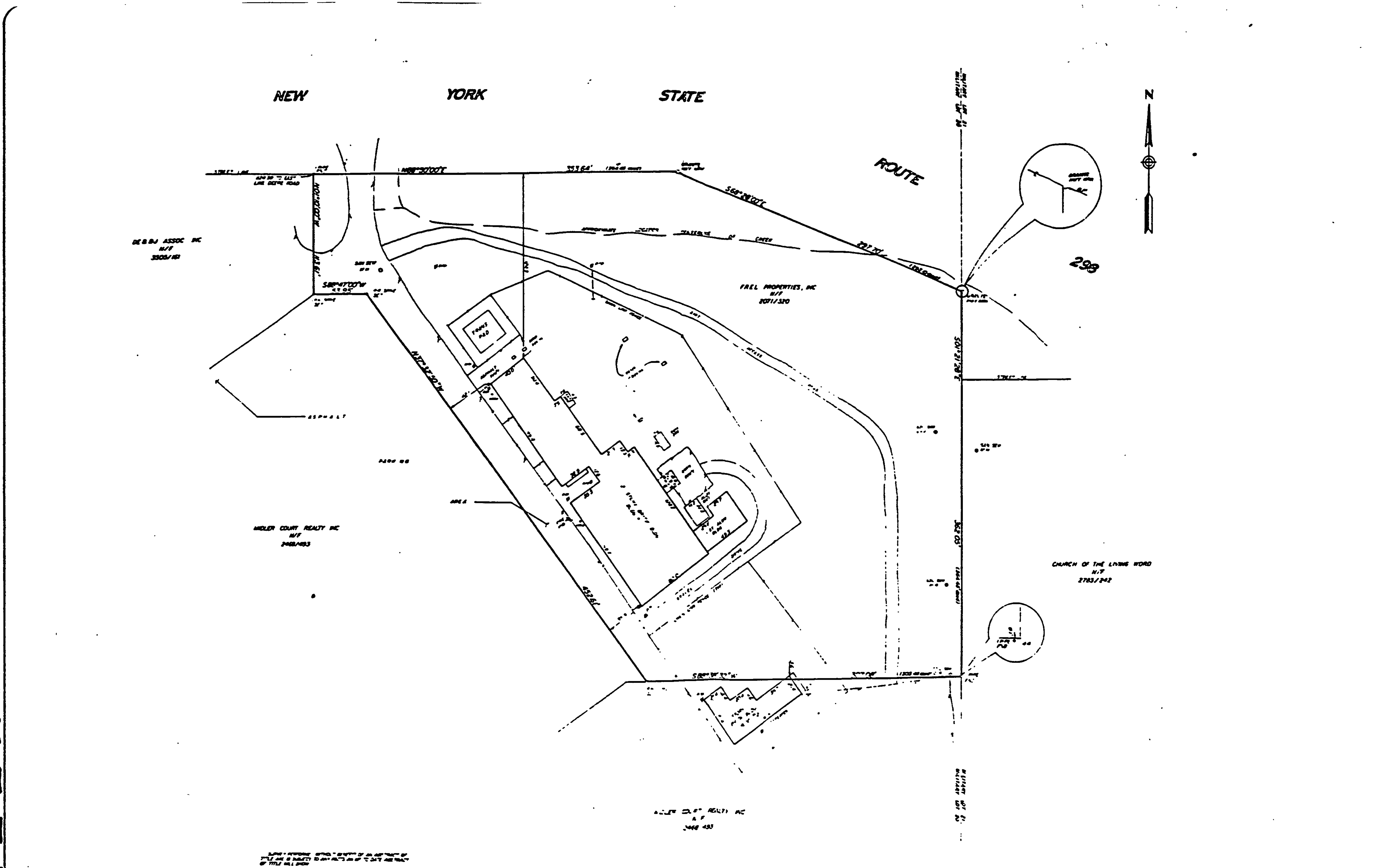
2700.029.113

O'BRIEN & GERE ENGINEERS, INC.

19 OCT 1990

APPENDIX E

BOUNDARY SURVEY



THE UNDERSIGNED HEREBY CERTIFIES THAT THIS IS A CORRECT MAP MADE FROM AN ACTUAL SURVEY

modi associates
CONSULTING ENGINEERS & LAND SURVEYORS
6263 SOUTH BAY ROAD
CLAY, N.Y. 13041/315/699-9006
FACSIMILE 315/699-9899

PROJECT NAME
PART OF MILITARY LOT 20
TOWN OF DEWITT
COUNTY OF ONONDAGA
STATE OF NEW YORK

DRAWING TITLE
BOUNDARY SURVEY

Scale
Drawing No
Date

Exhibits

O'BRIEN & GERE

EXHIBIT A

WORKER EXPOSURE TO LEAD TITANATE ZIRCONATE IN AN ONTARIO COMPANY

Worker Exposure to Lead Titanate Zirconate in an Ontario Company

M. L. Roy, MD, PhD; S. Siu, MD; W. Waddell, MD; and P. Kennedy, BSc

An Ontario plant with 101 workers, producing and using the ceramic compound lead titanate zirconate (LTZ), was investigated. Although air lead levels were high in most plant areas, 88 workers not exposed to lead oxide but to LTZ in the process had normal blood lead levels. In addition, no radiographic changes or abnormal pulmonary function test results were detected in 61 examined workers. The particle size of LTZ was determined to be less than 5 micrometers, and the solubility of LTZ in body fluids was found to be significantly less than lead oxide. The authors postulate that the observed low toxicity of LTZ could be due to its low solubility in body fluids. Further studies of the toxicity of LTZ and other less soluble lead compounds are recommended.

1

Most toxicologic studies of lead compounds have focused on exposure to lead oxide or metallic lead fume, which are relatively soluble in body fluids. Inhaled lead compounds may become bioavailable through solubilization processes occurring during long residence times in the lung or after ingestion following clearance from the lung. Less soluble forms of lead, such as lead sulfide[1] or some lead-containing ceramic compounds,[2,3] have generally been regarded as less hazardous than the more soluble forms.

We describe an investigation of an Ontario workplace where lead titanate zirconate (LTZ), a ceramic compound containing approximately 60% lead, is produced and used in the manufacture of sonar components. Although air lead levels in the plant were elevated, workers inadequately protected with respirators did not exhibit elevated blood lead levels. Based on toxicology studies previously carried out on LTZ and our own investigation of some of the properties of LTZ, a hypothesis to explain this lack of toxic effect is presented.

Manufacturing Process

This company manufactures piezoelectric ceramic parts for use in sonar equipment. In the manufacturing process, quantities of lead oxide, titanium dioxide, and zirconium oxide powders are weighed out and mixed in the powder area and "doped" with small amounts of barium and silver. This mixture is then calcined for 24 hours at 1000°C in small batches. The LTZ produced in this process is then milled to a particle size of 5 μm or less. The milled LTZ is slurried with a polyvinyl alcohol-water binder, formed into the desired shapes in presses, bisque-fired at 600°C, and final-fired at 1800°C. The ceramic pieces are then wet-ground and slurry-lapped to the prescribed tolerances, silvered by dipping or screening, polarized in a mineral oil bath, and degreased prior to packaging and shipping. The production process is summarized in the flow diagram shown in Fig. 1.

2

3

The use of respiratory protection in this plant was almost entirely confined to the workers involved in the mixing, calcining, and milling operations. Over the course of 9 years (1979 to 1987), improvements in engineering controls, personal hygiene facilities, and respiratory protection have been effected as a result of almost every inspection.

Results

Air Sampling

The mean air lead levels (time-weighted average) for personal samples in all sampling years between 1979 and 1987 and for area samples (time-weighted average) in 3 of the 4 sampling years exceeded by as much as 140

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0096-1736/89/3112-0986$02.00/0

times the threshold limit value of the American Conference of Government Industrial Hygienists and the Ontario Ministry of Labour time-weighted average exposure (TWAE) of 0.15 mg/m³. These results are summarized in Table 1.

The analytical method used to determine air lead levels measured the total inorganic lead in the sample and did not differentiate between lead oxide dust and LTZ dust. Total dust levels in the plant would be higher than air lead levels, and may be estimated by extrapolation of air lead levels based on the 60% lead content of LTZ.

Extensive air sampling for lead was conducted over a period of 2 days in 1987. Twenty-seven personal samples were taken, including nine long-term samples lasting at least 6 hours and 18 short-term samples lasting between 15 and 30 minutes. These 1987 air sampling results are summarized in Table 2.

Biological Monitoring

The company provides a medical surveillance program that consists of a monthly blood lead determination for workers in the mixing area where lead oxide is present, and an annual blood lead determination in all

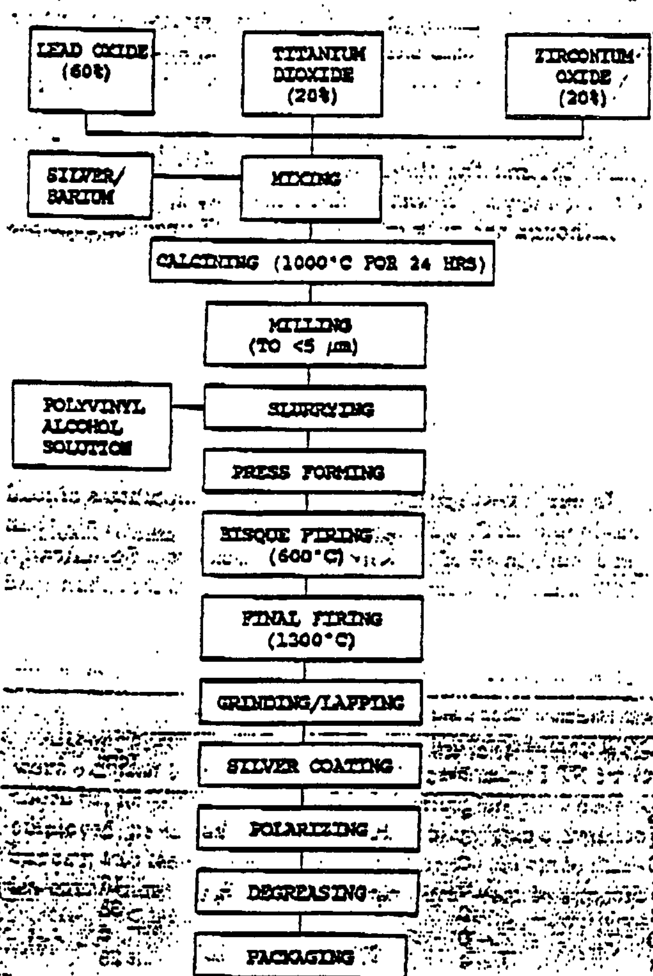

Fig. 1. Production process summary.

TABLE 1
Mean Air Lead Levels, 1979–1987

Year	Mean Air Lead Level, Personal Samples, mg/m³	Mean Air Lead Level, Area Samples, mg/m³
1979	1.5	0.9
1980	2.6	0.9
1984	1.4	0.1
1987	2.7	0.8

other areas. From 1980 to 1987, the mean blood lead levels of the workers at this company did not exceed 37.2 μg/100 g of blood (1.9 μmol/L). An analysis of employee records showed that the employee population was reasonably stable, with 58% of employees tested in 1980 still employed in 1984. This suggests that the low blood lead levels observed in the majority of employees cannot be attributed to rapid turnover of staff.

The mean blood lead levels shown in Table 3 were calculated using the average blood lead value of each employee for the year. The ranges were determined using the maximum and minimum average blood lead level for each year. For the purposes of this study, a blood lead level above 37.2 μg/100 g of blood (1.9 μmol/L) is considered to be elevated. Although symptoms of lead intoxication are not expected at 37.2 μg/100 g of blood (1.9 μmol/L), increased urinary aminolevulinic acid and coproporphyrin excretion, which occur at this level, are considered indicative of changes in the production of hemoglobin.

Table 4 shows the maximum blood lead levels of workers by work area for blood samples taken during the 1985 to 1986 period. A total of 207 blood samples from 101 workers were analyzed during this period. Due to the retrospective nature of this study, the job descriptions of 28 out of the 101 workers could not be determined.

Chest Roentgenograms and Pulmonary Function Tests

Because dust levels in the plant were excessive, and this dust was thought to consist mainly of LTZ, the possible effect of LTZ on the lungs was investigated. Chest roentgenograms and pulmonary function testing, including measurement of forced vital capacity and forced expiratory volume in 1 second, were carried out in 1987 for 61 employees. The average age of the group

TABLE 2
1987 Air Lead Sampling Results (Personal Samples)

Work Area	No. of Samples	Maximum Air Lead Level, mg/m³	Time-Weighted Average Air Lead Level, mg/m³
Mixing/weighing	3	9.7	3.5
Calcining	3	3.0	1.8
Milling	6	21	12
Pressing	3	2.0	1.9
Firing	6	0.80	0.75
Wet grinding	3	0.23	0.18
Wet lapping	3	0.29	0.29

TABLE 3
Blood Lead Level Means and Ranges, 1980–1987

Year	No. of Workers Sampled	Blood Lead Level Mean, µg/100 g of blood	Blood Lead Level Range, µg/100 g of blood
1980	33	25.5	9.8–37.2
1984	41	23.5	9.8–45.1
1985	25	21.6	11.8–37.2
1986	88	21.6	5.9–62.8
1987	79	19.6	3.9–45.1

TABLE 5
Relative Solubilities of Lead Contained in Lead Titanate Zirconate (LTZ) and Lead Oxide

Solvent	Lead Oxide, % Soluble Lead	LTZ, % Soluble Lead	Relative Solubility Lead Oxide/LTZ
Distilled H_2O	0.020	0.00085	24:1
0.1 N HCl	14.7	1.04	14:1
Human serum	0.032	0.01	3:1

tested was 32 years, ranging from 18 years to 60 years, with exposure to LTZ dust for up to 9 years. Despite inadequate respiratory protection and exposure to high levels of LTZ dust, no evidence of alveolar deposition of radio-dense particles or any other radiologic abnormality was apparent in chest roentgenograms, and no significant abnormalities were observed in the results of pulmonary function tests.

Solubility Tests

The comparative solubilities of lead oxide and LTZ were determined by shaking samples of each with aliquots of distilled water, 0.1 N HCl (approximating stomach acid), and human serum for a minimum of 144 hours at room temperature. After centrifuging and filtering, the concentration of lead in the solutions was determined by graphite furnace atomic absorption spectroscopy. Analysis of serum, water, and HCl blanks showed the concentration of lead to be less than 50 ppb in all cases. The results are summarized in Table 5.

Particle Size Determination

The size of the LTZ particles was determined by optical microscopy. As shown in Fig. 2, more than 90% of the particles in the milled LTZ product were found to be of respirable size, ie, less than 5 µm in diameter.

Discussion

Air sampling results showed that, in general, airborne lead levels in this Ontario workplace greatly exceeded the Ontario standard. The dust in the plant was of respirable size, and hygiene and work practices in the plant were poor. Therefore, it was expected that lead intoxication and high blood lead levels would be observed in employees in this workplace. Evidence of lung damage in the workers due to exposure to high levels of dust was also expected.

In fact, studies of the blood lead levels of these employees showed that only those employees exposed to lead oxide at the beginning of the process had elevated blood lead levels. Specifically, in the mixing and weighing area where lead oxide is present, seven of 11 workers had blood lead levels of 37.2 µg/100 g of blood (1.9 µmol/L) or greater, and four of 11 workers had blood lead levels of 47.0 µg/100 g of blood (2.4 µmol/L) or greater. In the calcining area, where the lead oxide/titanium dioxide/zirconium oxide mixture is sintered, one of four workers had blood lead levels of 37.2 µg/100 g of blood (1.9 µmol/L) or more. For employees working in areas where lead oxide was not handled, the incidence of elevated blood lead levels was much lower. Only one of the 13 workers in the grinding/lapping area had a blood lead level in excess of 37.2 µg/100 g of blood (1.9 µmol/L), and the single employee in the pressing area did not show an elevated blood lead level.

Although the bulk of the milled LTZ product consists of particles of respirable size (less than 5 µm), and the dust levels in the plant were excessively high, pulmonary function tests of the Ontario workers showed no significant abnormalities, and chest roentgenograms showed no evidence of fibrosis. These results indicate a lack of acute pulmonary effects from exposure to LTZ, although the occurrence of such effects after a longer exposure period cannot be ruled out.

In our investigation of the relative solubilities of lead oxide and LTZ, LTZ was significantly less soluble than lead oxide in all of the solvents investigated. Specifically, LTZ was approximately 24 times less soluble than lead

TABLE 4
Distribution of Maximum Blood Lead Levels as a Function of Work Area in 1985–1986

Work Area	No. of Workers with Maximum Blood Lead Levels in Specified Ranges				
	0–<37.2 µg/100 g	37.2–<47.0 µg/100 g	47.0–<66.6 µg/100 g	>66.6 µg/100 g	Total
Mixing/weighing	3	3	4	1	11
Calcining	3	1	0	0	4
Pressing	1	0	0	0	1
Wet grinding/wet lapping	12	1	0	0	13
Office/research/development	37	1	0	0	38
Maintenance	6	0	0	0	6
Unknown	23	1	4	0	28
Total	85	7	8	1	101

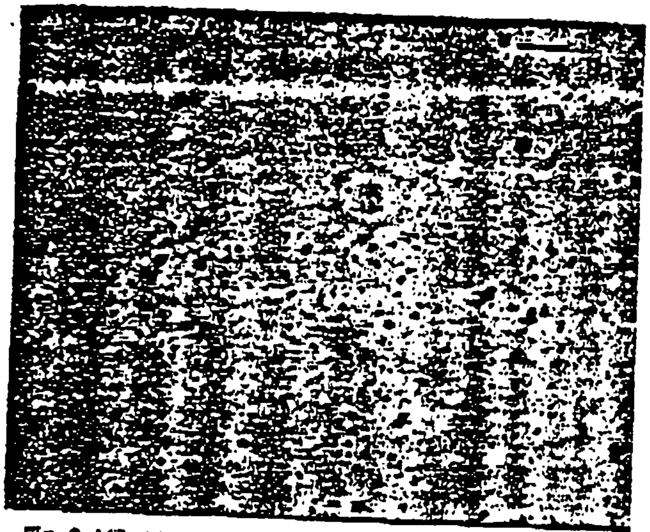

Fig. 2. Milled lead titanate zirconate powder showing grain size. Original magnification ×400; bar = 25 μm.

oxide in distilled water, 14 times less soluble in 0.1 N HCl, and 3 times less soluble in human serum.

The only previous studies of the toxicology of LTZ that are available were reported by a group of Russian researchers.[4-6] These researchers reported that LTZ was slightly toxic by oral ingestion with an oral LD_{50} (rat) of greater than 15 g/kg.[4-6] The low oral toxicity was attributed by the authors to the low solubility of LTZ at physiologic pH.[6]

The Russian researchers reported an inhalation LC_{50} (rat, 4 hr) value of greater than 1.5 g/m^3 for LTZ.[4-6] These same researchers have reported that rats exposed by inhalation to an LTZ level of 297 mg/m^3 for 4 months exhibited unspecified "characteristic signs" of lead intoxication. Inhalation of LTZ by rats at a level of 25.6 mg/m^3 for 4 months produced increased ALA and coproporphyrin excretion but no signs of lead intoxication. Inhalation exposure of rats to lower LTZ levels did not produce increases in aminolevulinic acid and coproporphyrin excretion above normal levels.[4]

In a Russian workplace that manufactured LTZ using a process different from that used in the Ontario workplace, these authors found no evidence of lead intoxication or of respiratory effects attributable to LTZ in the exposed workers. The LTZ concentrations in this plant were reported to be in the 0 to 0.4 mg/m^3 range, measured as total dust, or 0 to 0.25 mg/m^3, as lead.[6]

Conclusion

Although workers in the Ontario plant producing LTZ were exposed to high levels of lead-containing LTZ dust, there is no evidence of lead intoxication in workers employed in areas of the plant where there was no exposure to lead oxide. The animal and workplace studies carried out by Russian researchers seem to support these findings. This is in concordance with reports of an apparent lower toxicity of insoluble compounds of lead, such as lead sulfide. LTZ dust also does not appear to be acutely fibrogenic.

The lack of elevated blood lead levels in the workers exposed to high concentrations of LTZ dust may be explained by the low solubility of LTZ in blood serum and in 0.1 N HCl (or stomach acid). The elevated blood lead levels exhibited by some workers were probably due to the exposure to lead oxide present at the beginning of the production process.

The routes of entry of lead into the body are probably through solubilization of lead-containing dust in the lung and through absorption from the gut after direct ingestion or following clearance from the lungs via the mucociliary escalator. Clearance of dust particles from the lung via the mucociliary escalator may also explain the lack of respiratory effect noted in these workers.

This study suggests that LTZ is relatively less toxic compared with more soluble forms of lead. A review of the toxicity of LTZ and other less soluble lead compounds is recommended with a view to reconsidering the application of the established exposure limit for more soluble inorganic lead compounds to LTZ and similar compounds.

Acknowledgments

This study was supported by the Ontario Ministry of Labour. The opinions expressed in this paper are solely those of the authors and do not necessarily represent the views of the Ministry of Labour. We thank Dr M. Nazar, I. Walkinshaw, G. Moselhy, and L. Mallin of the Occupational Health Laboratory, Ministry of Labour, for their assistance in the determination of solubilities and Dr J. Roos of the Medical Service Chest Clinic, Ministry of Labour, for providing pulmonary function test data. We also thank Dr P. Pelmear, Dr J. Stopps, and Dr D. Leong for helpful discussions, and T. Pang of the Occupational Health Laboratory for taking an optical photomicrograph of milled LTZ powder. Special thanks are also given to G. Moselhy for translation of the Russian literature references.

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2. Brown JR, Mastromatteo E. Acute oral and parenteral toxicity of four titanate compounds in the rat. *Ind Med Surg.* 1962;31:302–304.

3. Harrold GC. Solubility of lead compounds in human pleural fluid and blood serum. *J Ind Hyg Toxicol.* 1949;31:327–335.

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EXHIBIT B

LEAD DUST IN RESIDENTIAL AREAS

TABLE 4

LEAD DUST IN RESIDENTIAL AREAS (U.S. EPA, 1984)

Sampling Site	Concentration µg Pb/g	Reference
Philadelphia:		
Classroom	2,000	
Playground	3,000	
Window Frames	1,750	Shapiro et al (1973)
Boston and New York:		
House Dust	1,000 - 2,000	Needleman and Scanlon (1973)
Brattleboro, VT:		
In Home	500 - 900	Darrow and Schroeder (1974)
New York City:		
Middle Class Residential	610 - 740	Pinkerton et al (1973)
Philadelphia:		
Urban Industrial	3,900 930 - 16,000	Needleman et al (1974)
Residential	610 290 - 1,000	Needleman et al (1974)
Suburban	830 280 - 1,500	Needleman et al (1974)
Derbyshire, England:		
Low Soil Lead Area	520 130 - 3,000	Barltrop et al (1975)
High Soil Lead Area	4,900 1,050 - 28,000	Barltrop et al (1975)

EXHIBIT C

USEPA MEMORANDUM - INTERIM CLEANUP LEVELS FOR LEAD IN SOILS

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

SEP 1 1989

OSWER Directive #9355.4-02

MEMORANDUM

SUBJECT: Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites.

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response

Bruce Diamond, Director
Office of Waste Programs Enforcement

TO: Directors, Waste Management Division, Regions I, II, IV, V, VII and VIII
Director, Emergency and Remedial Response Division, Region II
Directors, Hazardous Waste Management Division, Regions III and VI
Director, Toxic Waste Management Division, Region IX
Director, Hazardous Waste Division, Region X

PURPOSE

The purpose of this directive is to set forth an interim soil cleanup level for total lead, at 500 to 1000 ppm, which the Office of Emergency and Remedial Response and the Office of Waste Programs Enforcement consider protective for direct contact at residential settings. This range is to be used at both Fund-lead and Enforcement-lead CERCLA sites. Further guidance will be developed after the Agency has developed a verified Cancer Potency Factor and/or a Reference Dose for lead.

BACKGROUND

Lead is commonly found at hazardous waste sites and is a contaminant of concern at approximately one-third of the sites on the National Priorities List (NPL). Applicable or relevant and appropriate requirements (ARARs) are available to provide cleanup levels for lead in air and water but not in soil. The current

National Ambient Air Quality Standard for lead is 1.5 ug/m^3. While the existing Maximum Contaminant Level (MCL) for lead is 50 ppb, the Agency has proposed lowering the MCL for lead to 10 ppb at the tap and to 5 ppb at the treatment plant[1]. A Maximum Contaminant Level Goal (MCLG) for lead of zero was proposed in 1988[2]. At the present time, there are no Agency-verified toxicological values (Reference Dose and Cancer Potency Factor, ie., slope factor), that can be used to perform a risk assessment and to develop protective soil cleanup levels for lead.

Efforts are underway by the Agency to develop a Cancer Potency Factor (CPF) and Reference Dose (RfD), (or similar approach), for lead. Recently, the Science Advisory Board strongly suggested that the Human Health Assessment Group (HHAG) of the Office of Research and Development (ORD) develop a CPF for lead, which was designated by the Agency as a B2 carcinogen in 1988. The HHAG is in the process of selecting studies to derive such a level. The level and documentation package will then be sent to the Agency's Carcinogen Risk Assessment Verification Exercise (CRAVE) workgroup for verification. It is expected that the documentation package will be sent to CRAVE by the end of 1989. The Office of Emergency and Remedial Response, the Office of Waste Programs Enforcement and other Agency programs are working with ORD in conjunction with the Office of Air Quality Planning and Standards (OAQPS) to develop an RfD, (or similar approach), for lead. The Office of Research and Development and OAQPS will develop a level to protect the most sensitive populations, namely young children and pregnant women, and submit a documentation package to the Reference Dose workgroup for verification. It is anticipated that the documentation package will be available for review by the fall of 1989.

IMPLEMENTATION

The following guidance is to be implemented for remedial actions until further guidance can be developed based on an Agency verified Cancer Potency Factor and/or Reference Dose for lead.

Guidance

This guidance adopts the recommendation contained in the 1985 Centers for Disease Control (CDC) statement on childhood lead poisoning[3] and is to be followed when the current or predicted land use is residential. The CDC recommendation states that "...lead in soil and dust appears to be responsible for blood levels in children increasing above background levels when the concentration in the soil or dust exceeds 500 to 1000 ppm". Site-specific conditions may warrant the use of soil cleanup levels below the 500 ppm level or somewhat above the 1000 ppm level. The administrative record should include background documents on the toxicology of lead and information related to site-specific conditions.

The range of 500 to 1000 ppm refers to levels for total lead, as measured by protocols developed by the Superfund Contract Laboratory Program. Issues have been raised concerning the role that the bioavailability of lead in various chemical forms and particle sizes should play in assessing the health risks posed by exposure to lead in soil. At this time, the Agency has not developed a position regarding the bioavailability issue and believes that additional information is needed to develop a position. This guidance may be revised as additional information becomes available regarding the bioavailability of lead in soil.

Blood-lead testing should not be used as the sole criterion for evaluating the need for long-term remedial action at sites that do not already have an extensive, long-term blood-lead data base[1].

EFFECTIVE DATE OF THIS GUIDANCE

This interim guidance shall take effect immediately. The guidance does not require that cleanup levels already entered into Records of Decisions, prior to this date, be revised to conform with this guidance.

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1 In one case, a biokinetic uptake model developed by the Office of Air Quality Planning and Standards was used for a site-specific risk assessment. This approach was reviewed and approved by Headquarters for use at the site, based on the adequacy of data (due to continuing CDC studies conducted over many years). These data included all children's blood-lead levels collected over a period of several years, as well as family socio-economic status, dietary conditions, conditions of homes and extensive environmental lead data, also collected over several years. This amount of data allowed the Agency to use the model without a need for extensive default values. Use of the model thus allowed a more precise calculation of the level of cleanup needed to reduce risk to children based on the amount of contamination from all other sources, and the effect of contamination levels on blood-lead levels of children.

REFERENCES

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2. 53 FR 31521, August 18, 1988.
3. Preventing Lead Poisoning in Young Children, January 1985, U.S. Department of Health and Human Services, Centers for Disease Control, 99-2230.

ATTACHMENT

U.S. EPA and Illinois EPA have adopted a cleanup objective for lead of 500 mg/kg total lead in soil. This objective was based upon the recommendation of the Centers for Disease Control (Preventing Lead Poisoning in Children, 1985). CDC stated, "In general, lead in soil and dust appears to be responsible for blood lead levels in children increasing above background levels when the concentration in the soil or dust exceeds 500 to 1000 ppm". CDC's criterion has been used as a cleanup level at a number of lead contaminated Superfund sites across the country.

This cleanup objective is also supported by the following discussions:

> Potential lead uptake into plants (particularly in gardens) must also be considered. Several factors affect lead content in urban-grown vegetables, including soil pH, level of lead in the soil, organic matter content, cation exchange capacity, presence of other elements (especially phosphorus and sulfur), plant age and species, part of the plant eaten (leaf, root, or fruit), and nearness of automobile emissions.
>
> A study of soil contamination and plant lead uptake was conducted on Boston urban gardens and published in Communication in Soil Science and Plant Analysis (1979). The study found that plant uptake of lead was greatest in leafy greens, intermediate in root crops, and minimal in fruit crops. Based on the results of this study, it was recommended that gardeners confine gardening to fruiting crops in soil with lead levels greater than 1000 mg/kg. In addition, where soil lead ranged from 500-1000 mg/kg, gardeners were advised against planting leafy greens and plants such as beets and turnips.